

# CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report /  
Environmental Impact Statement

## Working Draft

Bakersfield to Palmdale

## Preliminary Alternatives Analysis Report

### Volume I

September 2010

California High-Speed  
Rail Authority



U.S. Department of Transportation  
Federal Railroad Administration



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## ABBREVIATIONS/ACRONYMS

AA.....	Alternatives Analysis
Amtrak .....	National Railroad Passenger Corporation
Authority .....	California High-Speed Rail Authority
BNSF .....	BNSF Railway Company
Caltrans .....	California Department of Transportation
CEQA.....	California Environmental Quality Act
CHRIS .....	California Historical Resources Information System
EIR.....	Environmental Impact Report
EIS.....	Environmental Impact Statement
FRA .....	Federal Railroad Administration
GIS .....	Geographic Information System
HST.....	High-Speed Train
I.....	Interstate
LEDPA .....	Least Environmentally Damaging Practicable Alternative
LOS .....	Level of Service
mph .....	Miles per Hour
NEPA.....	National Environmental Policy Act
PMT .....	Program Management Team
ROW .....	Right-of-way
RTP.....	Regional Transportation Plan
SJVR.....	San Joaquin Valley Railroad
SR.....	State Route
STIP .....	State Transportation Improvement Program
TOD .....	Transit Oriented Development
TWG.....	Technical Working Group
USEPA .....	U.S. Environmental Protection Agency
UPRR.....	Union Pacific Railroad
USACE .....	U.S. Army Corps of Engineers
USGS.....	U.S. Geological Survey

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## ES.0 EXECUTIVE SUMMARY

### ES.1 RESULTS FROM THE PRELIMINARY ALTERNATIVES ANALYSIS

#### **Purpose and Location**

This Preliminary Alternatives Analysis Report for the Bakersfield to Palmdale Section identifies feasible and practicable high-speed train (HST) study alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The environmental document for the Bakersfield to Palmdale Section will include the area between the Bakersfield and Palmdale HST Stations. However, for the purposes of this Alternatives Analysis (AA), study area boundaries have been set by match points with the Fresno to Bakersfield Section on the north and the Palmdale to Los Angeles Section on the south. Within those limits, the Bakersfield to Palmdale section has been divided into three subsections having widely varying topography, climate, and land use (see Figures ES-1 through ES-3). The subsections are (from north/west to south/east):

- **Edison (E)** – Begins east of the Fresno to Bakersfield Section at Edison Highway/Oswell Street, passes through the unincorporated community of Edison, and follows State Route 58 (SR-58) before crossing Caliente Creek. This Central Valley subsection consists mainly of industrial and residential land uses in the west and agricultural land uses in the east.
- **Tehachapi (T)** – Begins east of Caliente Creek, passes over the Tehachapi Mountains to the high desert west of Mojave, and ends near SR-14 and Purdy Avenue in Mojave. This subsection includes forest, desert, mountain areas, some residential land uses, and light industrial facilities.
- **Antelope Valley (AV)** – Begins at Purdy Avenue in Mojave, generally parallels Sierra Highway and the UPRR through the desert communities of Rosamond and Lancaster, and ends at Avenue M between the cities of Lancaster and Palmdale. The Antelope Valley Subsection runs through primarily low density urban land uses separated by extended open areas.

No HST stations are located between Bakersfield and Palmdale.

#### **Recommendations**

The following alignment alternatives are recommended to be carried forward for further study in the Bakersfield to Palmdale Section HST Project EIR/EIS:

##### **Edison Subsection**

- E2A: SR-58 Adjacent North Side (Partially Elevated)
- E2B: SR-58 Adjacent North Side (All Elevated)
- E4: Along Edison Highway, Through Town of Edison (All Elevated)

##### **Tehachapi Subsection**

- Alternative T3-1 – Quantum-Generated Alignment
- Alternative T3-2 – Modified Quantum-Generated Alignment
- Alternative T3-B – Phase Break Alignment
- Alternative T3-2B – Revised Phase Break Alignment

### **Antelope Valley Subsection**

- AV3B: Between UPRR and Sierra Highway (Partially Elevated)
- AV4 Option: Within or Adjacent to Sierra Highway – Completely avoids UPRR Right-of-way (Primarily Elevated)

The recommended alternatives through the Edison Subsection parallel either Edison Highway or SR-58, and are fully elevated or partially elevated.

The recommended alternatives in the Tehachapi Subsection are a combination of elevated, tunnel, and at-grade sections that, in general, parallel SR-58, but follow a more direct path to maintain design standards and optimum slopes. Two of the alternatives allow for a traction power phase break, which is a very short stretch of track where electric power to the HST system switches from one source to another, to be incorporated into a relatively flat area of the Tehachapi incline west of the community of Keene.

The recommended alternatives in the Antelope Valley Subsection are primarily elevated through Rosamond and Lancaster but would be built at grade in the less developed areas adjacent to the west side of the UPRR and Sierra Highway.

Table ES-1 summarizes the findings and recommendations of this AA for all alignment alternatives considered. Alternatives recommended to be carried forward into the EIR/EIS are shown in Figure ES-4. Those study alternatives recommended not to be carried forward into the EIR/EIS are shown in Figures ES-5 and ES-6.

## **ES.2 ALTERNATIVE ANALYSIS EVALUATION MEASURES**

The initial alignment alternatives and design options carried forward into the detailed AA were assessed for each of the project objectives and evaluation measures. This information was then used to determine which alternatives should be carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. The primary evaluation measures are listed below.

- Design objectives (including measures such as travel time and cost)
- Land use (including measures such as consistency with land use and general plans)
- Constructability (including measures such as type of construction, cost, and access to the corridor)
- Community impacts (including measures such as amount of land acquisition)
- Natural resources (including measures such as impacts to wetlands, potential threatened and endangered species habitat, and important farmlands)
- Environmental quality (including measures such as number of sensitive noise receptors)
- Additional considerations (including measures such as ability to meet project purpose and support by public and agencies)

## **ES.3 BAKERSFIELD TO PALMDALE HIGH SPEED TRAIN PROJECT BACKGROUND**

In 2005, the California High-Speed Rail Authority (Authority) and Federal Railroad Administration (FRA) completed a Statewide Program EIR/EIS. As part of the evaluation, six general alignment corridors were considered for the Bakersfield to Sylmar section. Only three of those six corridors connected Bakersfield with Palmdale, and generally followed the, (1) SR-58/Soledad Canyon, (2) SR-138, and (3) the California Aqueduct corridors. Subsequently, both the SR-138 and Aqueducts alignments were eliminated due to constructability and seismic constraints. Both alignments would require long tunnels and sustained



slopes much greater than current HST rolling stock could achieve, and would also cross multiple seismic faults below grade, which is prohibited by design standards. In contrast, the SR-58/Soledad Canyon alignment offers acceptable slopes and minimizes tunnel length and also allows crossing faults at grade. As a result, the SR-58/Soledad Canyon alignment was selected as the Program EIR/EIS Preferred Alignment for the Bakersfield-Palmdale Section. The Bakersfield to Palmdale HST Project EIR/EIS builds upon this earlier work and is incorporated in this Preliminary AA Report. It also incorporates the subsequent development of preliminary engineering designs and an assessment of potential environmental effects associated with HST system construction, operation, and maintenance along the State Route 58/14 corridor from Bakersfield to Palmdale.

#### **ES.4 PUBLIC AND AGENCY OUTREACH EFFORTS**

In addition to performing engineering and environmental analysis, the Authority and FRA have actively engaged local representatives and public agencies, business and agricultural interests, the general public, and the communities along the corridor in the development of this document. As part of this outreach, the Authority and the FRA in August 2009 began a project-level environmental review of the Bakersfield to Palmdale HST Section consistent with CEQA and NEPA requirements. Scoping meetings were held in September 2009 to receive input on the scope of issues that should be analyzed in the EIR/EIS. A scoping report documenting the results of this process was published in December 2009 and is available for review at <http://www.cahighspeedrail.ca.gov/library.asp?p=8593>.

Agency, general public, and small group meetings have also been held throughout the AA process. The purpose of these meetings has been to explain the AA process, share the results of the preliminary studies with the public and agencies, and receive feedback on the alternatives considered. Input and comments were considered for the initial alignment alternatives and design options presented in this AA Report. Feedback from the public and agencies included issues such as noise, visual impacts, vibration, community cohesion, biological impacts, project cost and funding, right-of-way, and more.

#### **ES.5 NEXT STEPS**

This Preliminary AA Report for the Bakersfield to Palmdale Section will be used to help prepare the Project Description for the EIR/EIS, which will set forth the parameters for the next level of design and stage of environmental analysis. Specific activities will include:

- Board Action to Accept Staff Recommendations on Alternatives to be Carried Forward
- Continue to meet with Stakeholders and the Public
- Prepare Supplemental AA Reports As Required
- Begin Environmental Studies and 15% Design
- Complete Draft EIR/EIS by July 2012
- Complete Final EIR/EIS by March 2013

As the engineering and environmental work continues, the Authority will also continue to meet with community groups, elected officials, and the public with an interest in the Bakersfield to Palmdale Section. This ongoing work will also provide the Authority, FRA, and the communities in the Bakersfield to Palmdale Section with a more complete description of both the design options in each subsection and a comprehensive vision of the entire corridor.

A Supplemental Alternatives Analysis report will be prepared to describe further developments and changes to the range of study alternatives based on design or engineering refinements and response to comments received by the Authority and FRA on the Preliminary Alternatives Analysis Report.

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Table ES-1: Alignment Alternatives Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P—Primary S—Secondary)							ENVIRONMENTAL/OTHER CONCERNS	
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment		
Edison Subsection											
E2A: SR-58 Adjacent North Side (Partially At-Grade)	X									Requires reconstruction of five interchanges along SR 58; Lower construction costs resulting from at-grade construction would be increased by reconstruction of multiple SR-58 interchanges; 157 acres of agricultural land would be permanently displaced,	
E2B: SR-58 Adjacent North Side (All Elevated)	X									Displaces slightly less acreage of farmland than E2A, but allows possibility of replanting crops underneath elevated structures along the north side of SR 58; Requires some reconstruction of SR-58 ramps	
E3: In SR-58 Median (All Elevated)		X	P		S				S	Would require a 2-mile realignment of SR-58 and reconstruction of multiple overpasses to conform with HST geometry or use of massive straddle bents spanning the freeway; Lengthy approval process from Caltrans required; Realignment and reconstruction of SR-58 would displace 81 acres of farmland; Highest capital cost and greatest length of elevated alignment; Construction and maintenance of HST structures within the SR-58 right of way would require temporary closure of freeway lanes with coordination and approval from Caltrans.	
E4: Along Edison Highway (All Elevated)	X									Least amount of agricultural land affected; Requires less roadway reconstruction than E2 and E3 Alternatives; Would affect the most residential parcels; Offers opportunity to place HST columns in county right-of-way or undeveloped strip of land adjacent to Edison Highway; HST alignment passes near but does not displace school facilities or residences in town of Edison; May impede access to packing and shipping plants along Edison Highway; Requires minor realignment of Edison Highway and redesign to improve vehicle circulation through the town of Edison	
Tehachapi Subsection											
T3-1: Quantm-Generated Alignment, 2.65% Average Slope, 2.75% Sustained Slope over 12 miles	X									T3-1 offers an overall reduction in length and height of viaducts as compared to T3-2, and has the lowest capital cost;; Does not allow “phase break for” traction power facilities; Crosses least amount of endangered species habitat..	
T3-2: Modified Quantm-Generated Alignment, 2.5% Average Slope, 2.5% Sustained Slope over 20 miles	X									Most amount of agricultural parcels affected; Most amount of elevated structure, least of tunneling; Higher capital cost than T3-2; Greatest maintenance cost because of the height and amount of elevated structures; Like T3-2B, crosses most acres of endangered species habitat.	
T3-B: Phase Break Alignment, 2.65% Average Slope, 3.5% Sustained Slope over 3.4 miles	X									Contains large cuttings and fillings of earth; 15% of the alignment is on viaduct and consists of several very tall structures (i.e. 150+ feet), increasing capital costs relative to T3-1 and T3-2; Least amount of agricultural parcels affected and less endangered species habitat than T3-2.	
T3-2B: Revised Phase Break Alignment, 2.5% Average Slope, 3.5% Sustained Slope over 3.4 miles	X									Least amount of elevated structure, most tunneling, so highest capital cost; Lowest maintenance cost because least amount of elevated structure; Least amount of residential parcels affected; Similar to T3-2, crosses most acres of endangered species habitat; Reduces area of wetland impact in Proctor Lake	

Table ES-1: Alignment Alternatives Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P—Primary S—Secondary)							ENVIRONMENTAL/OTHER CONCERNS
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
Antelope Valley Subsection										
AV2: East Side of UPRR (Mixed At-Grade and Elevated)		X	P		P			S		Affects access to the most parcels; Highest capital cost of all alternatives; Encroaches on multiple UPRR parcels; Requires two long skewed crossings of UPRR, requiring column placement for the elevated structure to be within the railroad right-of-way
AV3A: Between UPRR and Sierra Highway (All At-Grade)		X	P	P	P			S		Lowest capital cost of all alternatives; Lowest operating costs because less energy requirements due to the at-grade configuration; Requires closing or grade separating major east-west arterials; Conflicts with City redesign of Lancaster Boulevard and severs Lancaster Boulevard at Sierra Highway; Displaces the Lancaster Metrolink Station and some parking; Requires realignment of a portion of Sierra Highway; Displaces multiple commercial properties south of the Metrolink Station; Displaces existing bike path; Encroaches on UPRR property outside the nominal railroad right-of-way.
AV3B: Between UPRR and Sierra Highway (Partially Elevated)	X									Displaces the Lancaster Metrolink Station and some parking; Requires realignment of a portion of Sierra Highway; Displaces existing bike path; Encroaches on UPRR property outside the nominal railroad right-of-way; Displaces multiple commercial properties south of the Metrolink Station
AV4: Within or Adjacent to Sierra Highway (Primarily Elevated)		X			P			P		Requires realignment of a portion of Sierra Highway; Along with AV4 Option, affects the most residential parcels for noise and vibration; Conflicts with access to some local businesses and Whit Carter Park; Conflicts with redesign of Lancaster Boulevard; Displaces some Lancaster Metrolink Station parking; Encroaches on UPRR property outside the nominal railroad right-of-way; Displaces multiple commercial properties south of the Metrolink Station
AV4 Option: Within or Adjacent to Sierra Highway – UPRR Avoidance Option (Primarily Elevated)	X									Completely avoids UPRR property; Conflicts with access to some commercial properties south of Avenue J; Along with AV4, affects the most residential parcels for noise and vibration; Requires redesign of Sierra Highway north of Avenue I

Figure ES-1: Edison Subsection — Alignment Alternatives Considered

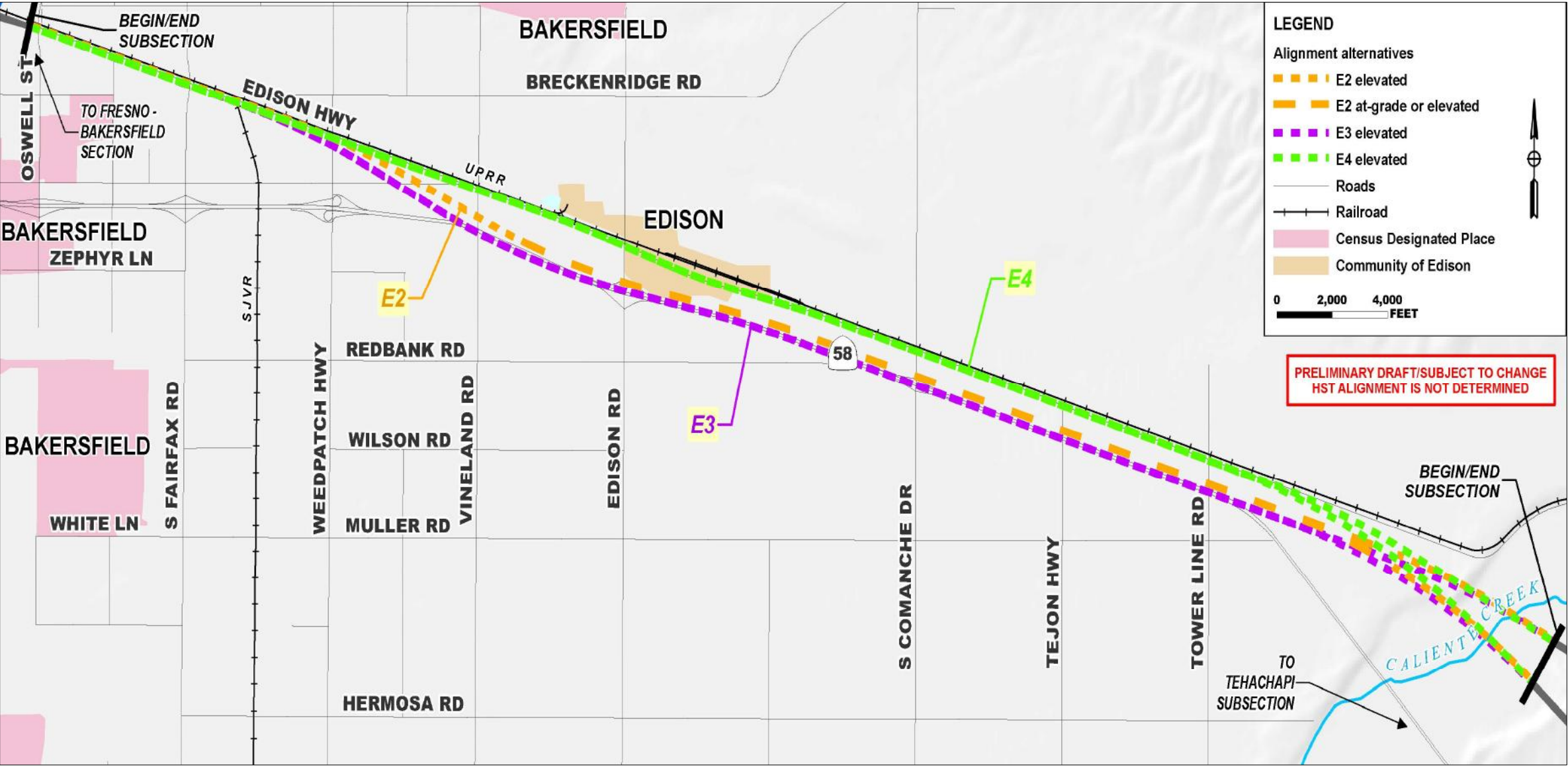




Figure ES-2: Tehachapi Subsection — Alignment Alternatives Considered

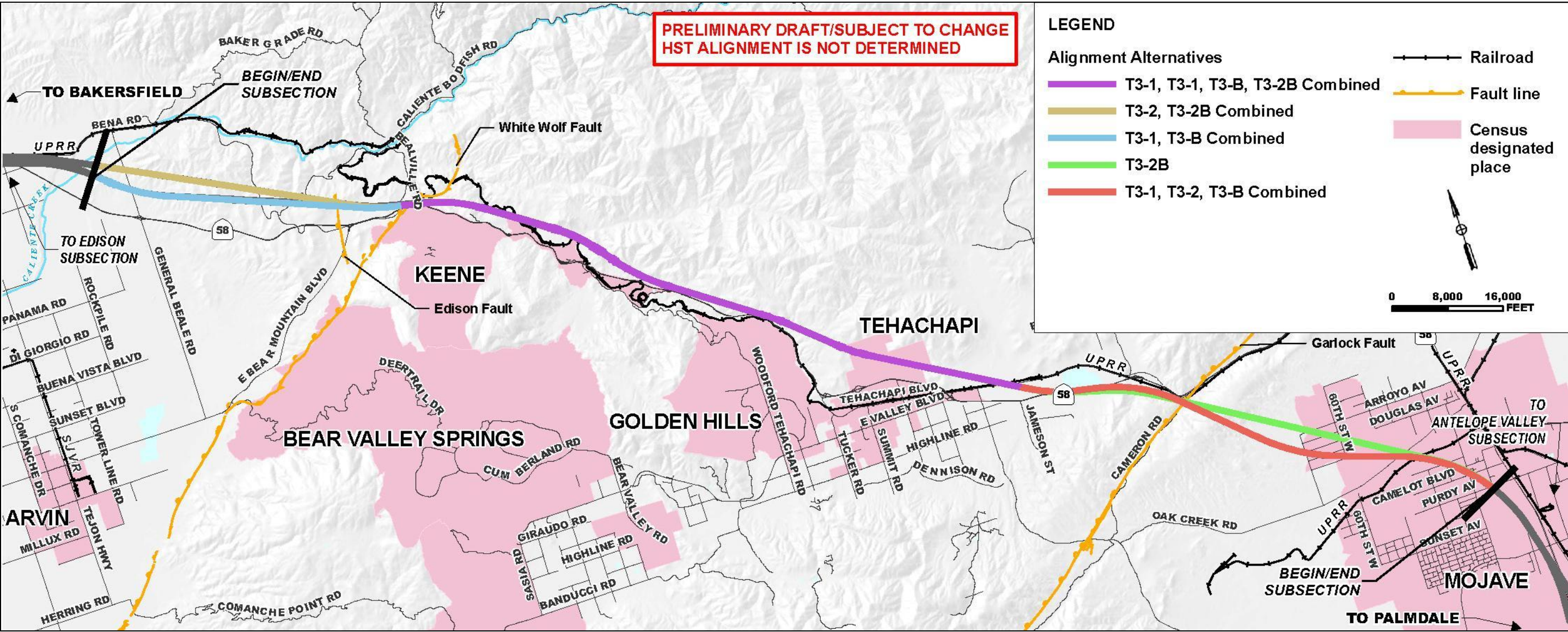




Figure ES-3: Antelope Valley Subsection — Alignment Alternatives Considered

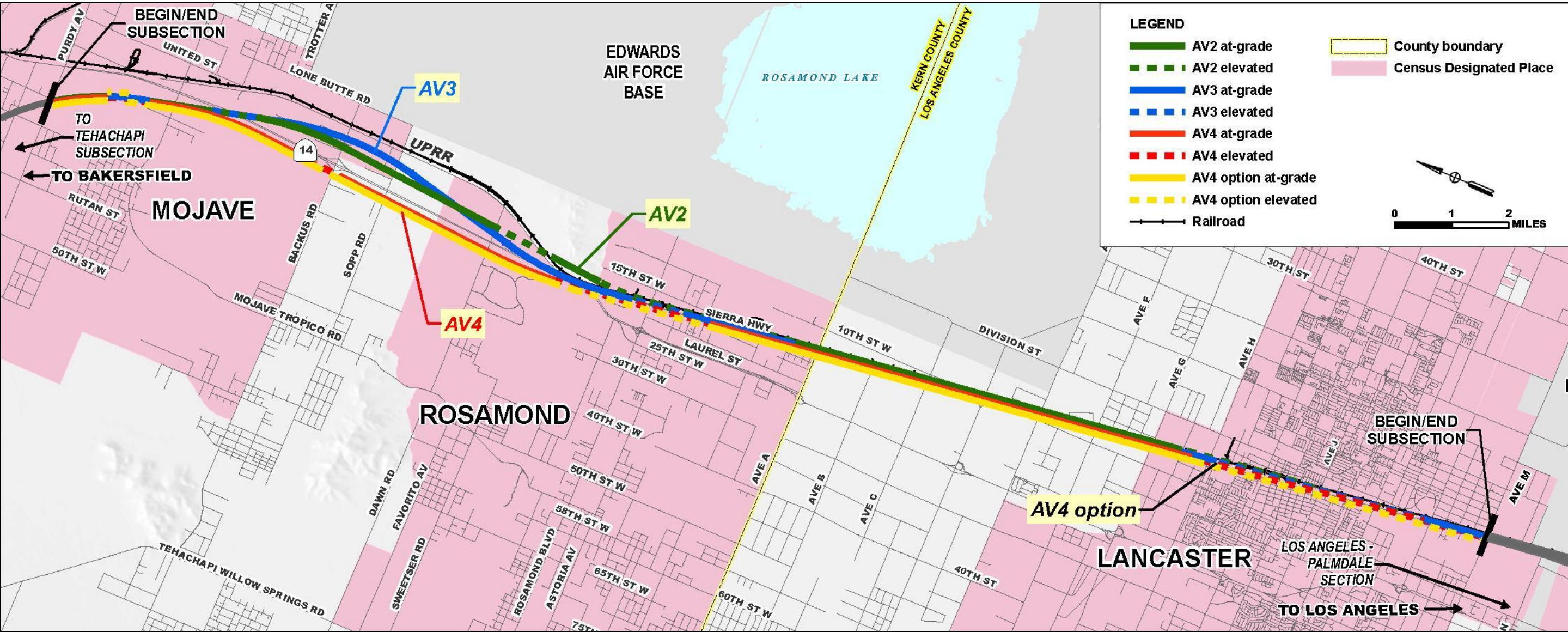




Figure ES-4: Alignment Alternatives Carried Forward for Evaluation in the Draft Project EIR/EIS

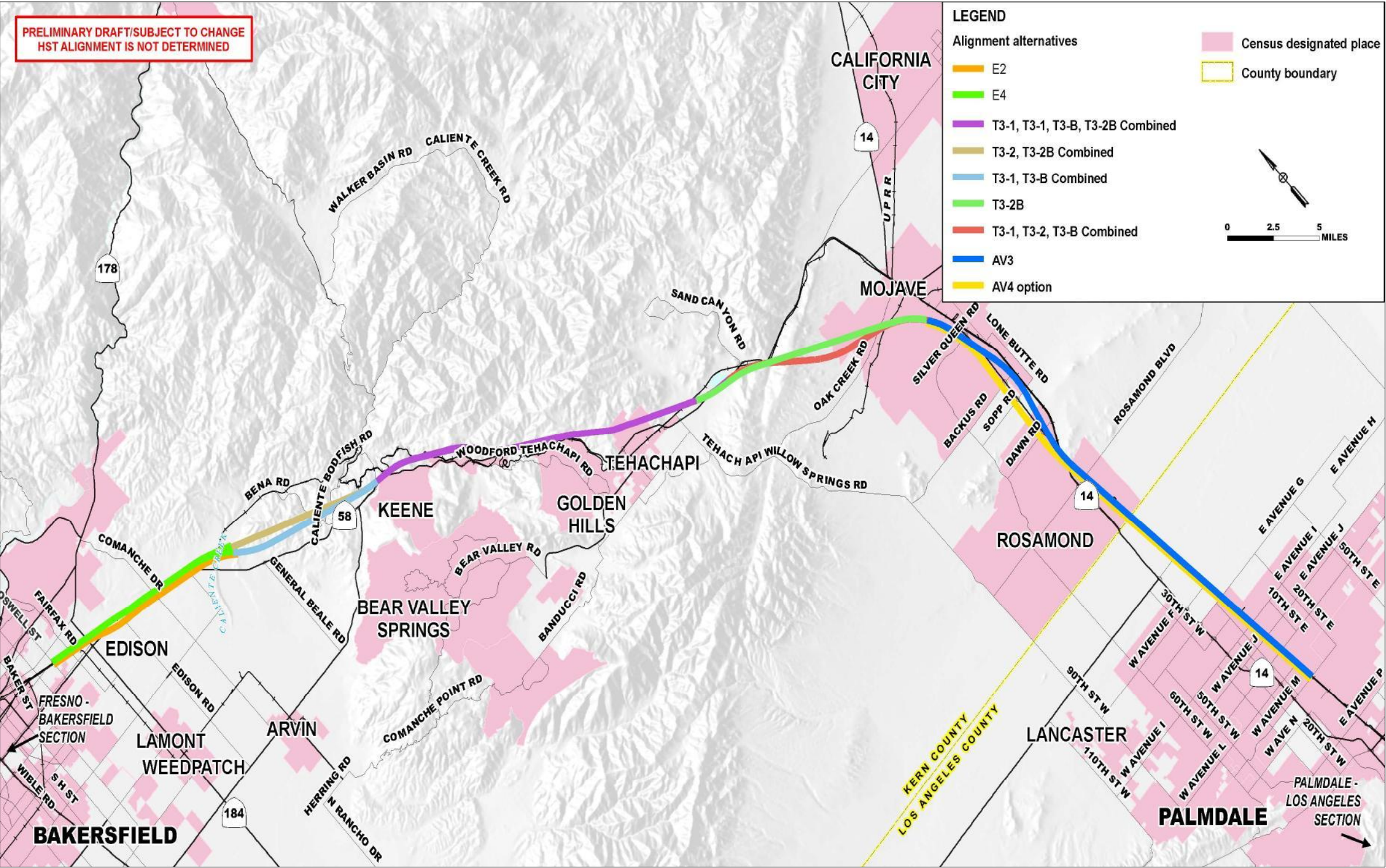




Figure ES-5: Edison Subsection — Alignment Alternatives Withdrawn

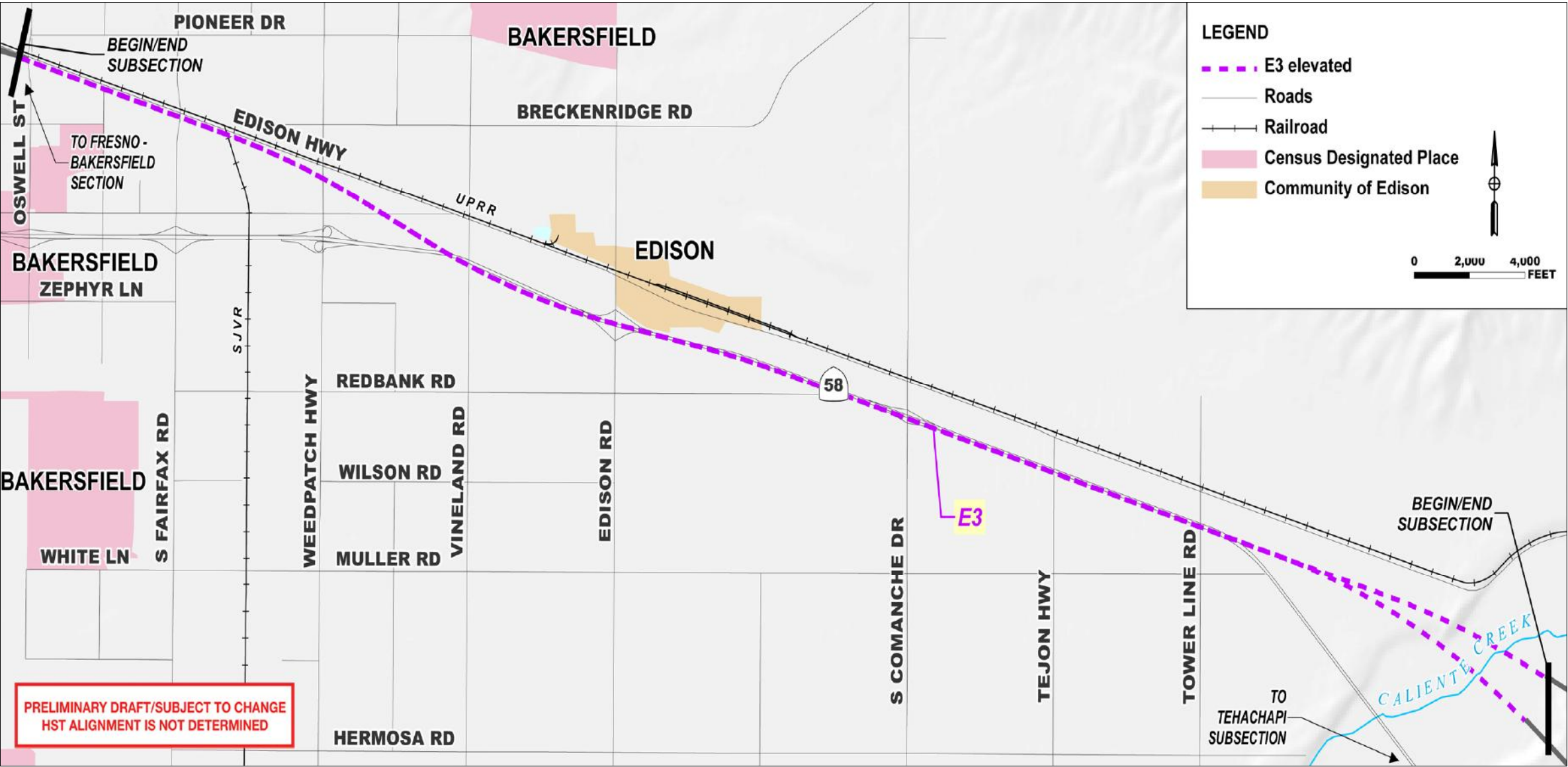
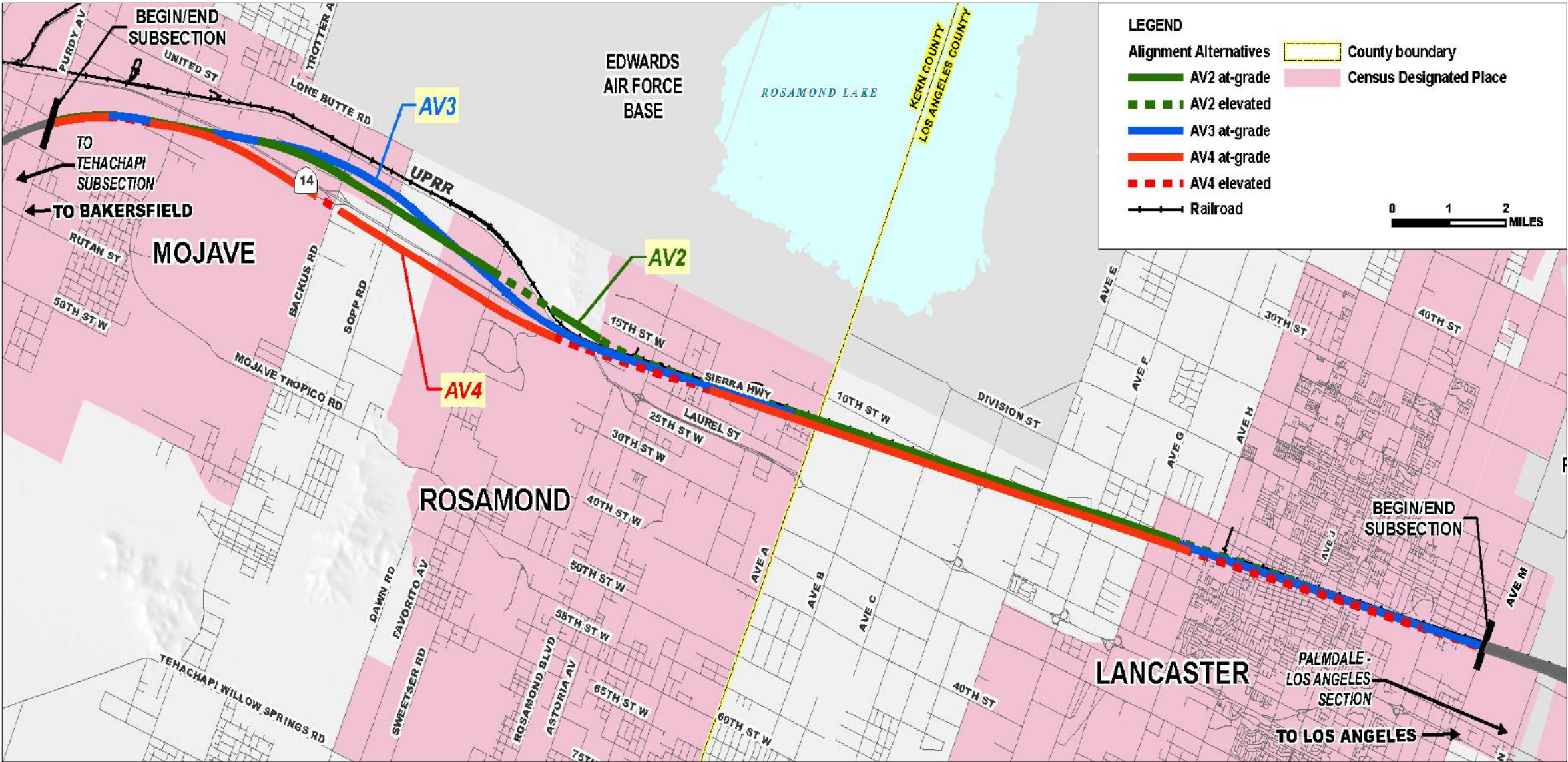


Figure ES-6: Antelope Valley Subsection — Alignment Alternatives Withdrawn





## 1.0 INTRODUCTION

The California High-Speed Rail Authority (the Authority) and the Federal Railroad Administration (FRA) are studying alternative alignments for a high-speed train (HST) section between Bakersfield to Palmdale. This report incorporates conceptual engineering information and identifies potentially feasible and practicable alternatives to carry forward for environmental review and evaluation in the Environmental Impact Report/Environmental Impact Statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Protection Act (NEPA) for the Bakersfield to Palmdale Section of the California HST Project.

Additionally, the Authority and the Federal Railroad Administration (FRA) are close to entering into a memorandum of understanding (MOU) with the U.S. Environmental Protection Agency (USEPA) and the U.S. Army Corps of Engineers (USACE) to integrate the NEPA process with the Clean Water Act (CWA) Section 404 process. The Section 404 (b)(1) process includes an alternatives analysis and, therefore, the objective is for USEPA and the USACE to reach concurrence with the Authority and the FRA on the alternatives to be carried forward into the EIR/EIS.

### 1.1. CALIFORNIA HST PROJECT BACKGROUND

The California HST is planned to provide intercity, high-speed train service on more than 800 route miles throughout California, connecting the major population centers of Sacramento, the San Francisco Bay Area, the Central Valley, Los Angeles, the Inland Empire, Orange County, and San Diego. The HST system is envisioned as a state-of-the-art, electrically powered, high-speed, steel-wheel-on-steel-rail technology, which will include contemporary safety, signaling, and automated train-control systems. The trains will be capable of operating at speeds of up to 220 miles per hour (mph) over a fully grade-separated, dedicated track alignment, with an expected express trip time between Los Angeles and San Francisco of approximately 2 hours and 40 minutes.

The California HST project will be planned and designed, and will be constructed and operated, under the direction of the Authority, a state governing board formed in 1996. The Authority's statutory mandate is to develop a high-speed rail system that is coordinated with the state's existing transportation network, which includes intercity rail and bus lines, regional commuter rail lines, urban rail and bus transit lines, highways, and airports.

### 1.2. BAKERSFIELD TO PALMDALE SECTION EIR/EIS BACKGROUND

The Bakersfield to Palmdale Section is a critical link connecting the Fresno to Bakersfield HST Section to the Palmdale to Los Angeles HST Section.

Six general alignment corridors were considered for the Bakersfield to Sylmar segment in the Statewide Program EIR/EIS (2005). Of these six alignments, only three distinct alignments connected Bakersfield with Palmdale. These three alignments generally followed three different corridors, SR-58/Soledad Canyon, SR-138, and the California Aqueduct. The SR-138 and Aqueducts alignments were eliminated due to constructability and seismic constraints. Both alignments would require long tunnels and sustained slopes much greater than current HST rolling stock could achieve, and would also cross multiple faults below grade, which is prohibited by the Authority's engineering standards. In contrast, the SR-58/Soledad Canyon alignment offers acceptable slopes and minimizes tunnel length and also allows crossing faults at grade. As a result, the SR-58/Soledad Canyon alignment was selected as the Preferred Alignment in the 2005 Final Program EIR/EIS for the Proposed California HST System (referred to hereafter as the Statewide Program EIR/EIS) for the study area that covers the Bakersfield-Los Angeles Section.

The Statewide Program EIR/EIS represented the first phase of a tiered environmental review process that

established the purpose and need for the HST system, analyzed a HST system, and compared it with a No Project/No Action Alternative and a Modal Alternative. Consistent with the HST project objective to maximize the use of existing transportation corridors and rights-of-way, to the extent feasible, most of the alternatives considered for the Bakersfield to Palmdale Section followed the SR-58/SR-14 corridor (Figure 1-1). This corridor was selected as the preferred alternative between Bakersfield and Palmdale in the Statewide Program EIR/ EIS.

In August and September 2009, the Authority issued a Notice of Preparation (NOP) and a Notice of Intent (NOI) for the Bakersfield to Palmdale Section Project EIR/EIS. The Authority then conducted scoping meetings in Bakersfield, Tehachapi, and Palmdale in mid-September 2009. The Bakersfield to Palmdale Section scoping process identified issues with proposed alignments, suggestions for new or modified alignments, and areas of potential concern related to the proposed high-speed train system, all of which have been summarized in the *Bakersfield to Palmdale, Scoping Report* – December 2009.

Alternatives for the Bakersfield to Palmdale Section were defined in an iterative process using information gathered from program-level work; the scoping process; Technical Working Group (TWG) meetings; public information meetings (PIMs); and other stakeholder outreach meetings with local jurisdictions, organizations, and enterprises. In general, the alternatives were modified from the Program EIR/EIS preferred alignment to comply with up-to-date design standards, to reduce potential land use and natural resource conflicts, and to minimize the amount of tunneling, which is the most costly aspect of rail construction. For the Tehachapi Mountains, the Authority used alignment optimization software, Quantm, which examines alignment routing options with considerable variation in profile, length, cost, and environmental impacts to ascertain the most viable paths. The process used to define, evaluate, and select initial alternatives for further study is detailed in Section 3.0. Alternatives that have been identified for detailed environmental review are described in Section 4.0.

### 1.3. STUDY AREA

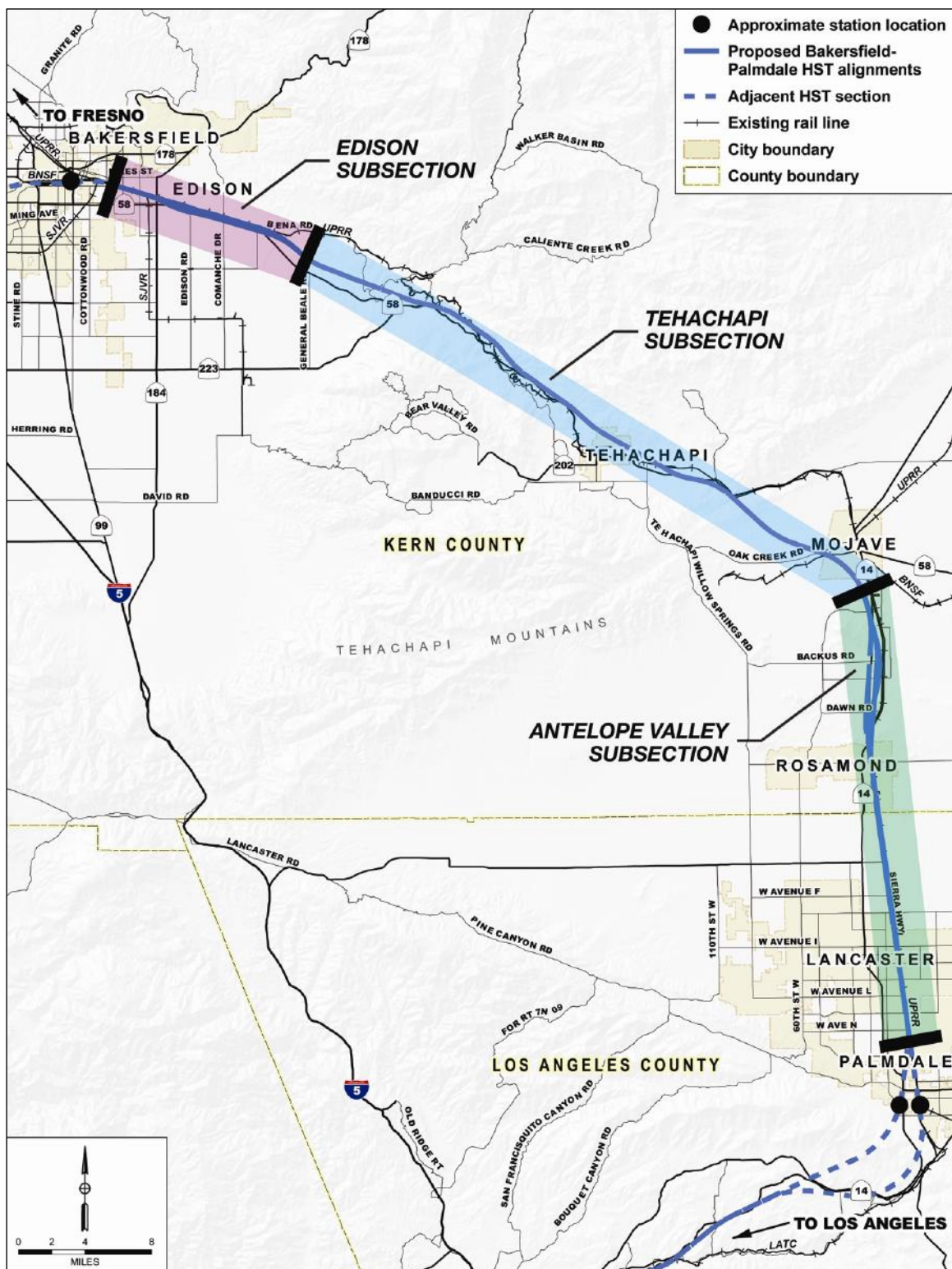
The Bakersfield to Palmdale HST project section is approximately 83 miles long, from the Bakersfield Station to the Palmdale Station. For the purposes of this Alternatives Analysis, the study area boundaries extend 77 miles from engineering match points with the Fresno to Bakersfield Section on the north and the Palmdale to Los Angeles Section on the south (refer to Figure 1-1). The match points are approximately three miles east of the Bakersfield Station at Edison Highway/Oswell Street and about three miles north of the Palmdale Station location at Avenue M/Sierra Highway in Lancaster. No HST stations are proposed between the Bakersfield and Palmdale.

To facilitate the alternatives analysis process, this section has been divided into three subsections, defined generally from west to east (see Figure 1-1):

- **Edison (E)** – From east of the Fresno to Bakersfield Section at Edison Highway/Oswell Street through the community of Edison, following SR-58 before crossing Caliente Creek. The Edison Subsection consists mainly of industrial and rural residential areas in the western part of the subsection before transitioning through Edison to mainly agricultural land uses.
- **Tehachapi (T)** – From just east of Caliente Creek, passing through the Tehachapi Mountains and traversing a high valley immediately north of the City of Tehachapi before exiting from a tunnel into the desert west of Mojave, and curving south near Purdy Avenue just west of SR-14. The Tehachapi Subsection travels through undeveloped forest, desert, and mountain lands, low density residential areas, and light industrial areas, including windfarms.
- **Antelope Valley (AV)** – From Purdy Avenue in Mojave, generally paralleling Sierra Highway and UPRR right-of-way through Rosamond and Lancaster to Avenue M, the Lancaster-Palmdale boundary. The Antelope Valley Subsection runs through low density suburban areas and undeveloped desert land before passing through downtown Lancaster and entering Palmdale.



**Figure 1-1: Bakersfield to Palmdale Section Overall Study Area (with Subsections)**



## **1.4. PURPOSE OF STUDY**

Following the guidance presented in *Alternatives Analysis Methods for Project EIR/EIS*, Version 2 (October 2009) (Appendix A), the Bakersfield to Palmdale Alternatives Analysis considers preliminary planning, environmental, and engineering information in order to identify alternatives to carry forward for environmental review in the Bakersfield to Palmdale HST Project EIR/EIS. The alternatives analysis is intended to identify a range of potentially feasible and practicable alternatives for further analysis and consideration.

This report documents the alternatives developed for consideration; describes the methodology and evaluation criteria (measures) used to determine which alternatives to recommend for detailed environmental analysis; summarizes the results of the evaluation of those alternatives; and concludes with a discussion of those alternatives recommended to be carried forward for further environmental analysis, and those that are not.

## 2.0 ALTERNATIVES DEVELOPMENT PROCESS

The Alternatives Analysis process involved the creation, comparison, and refinement of alternatives through a series of increasingly detailed steps. The methodology presented in this section follows guidance described in the *Technical Memorandum Alternatives Analysis for Project EIR/EIS* (October 2009) (see Appendix A) and uses both qualitative and quantitative evaluation measures that reflect a range of policy and technical objectives.

The following activities and methods were used to gather information necessary define and evaluate alternatives:

- **Field Inspections of Corridors** – Planners, engineers, and analysts with experience in rail construction and operations conducted field inspections of potential rights-of-way and station locations to identify conditions and factors potentially not visible in aerial photos or on maps. Over the course of the study, field inspections became progressively more detailed as the alternatives were refined.
- **Project Team Input and Review** – The project team conducted team meetings to discuss alternatives and issues that could potentially affect alignment alternatives.
- **Qualitative Assessment** – Alternative alignments were assessed using qualitative measures developed by project team members with experience in construction and operation of high-speed rail and other transportation systems. These measures included constructability, accessibility, operability, maintainability, right-of-way, public infrastructure impacts, railway infrastructure impacts, and environmental impacts.
- **Engineering Assessment** – Engineering assessments were provided for measures that could be readily quantified at this stage of project development. These assessments provided information on project length, travel time, and configuration of key features of alignment corridors such as the presence of existing infrastructure, the amount of agricultural land an alternative would impact, etc.
- **Geographic Information System (GIS) Analysis** – Much of the assessment was performed using GIS data, which enabled depictions of the project's interactions with a variety of measurable geographic features, both natural and built. GIS data were used to assess impacts on farmland, water resources, wetlands, threatened and endangered species, cultural resources, urban development, and infrastructure. (GIS data source references can be found in Appendix B.)

Based on these information-gathering activities, evaluation criteria (measures) and methods were applied to determine the extent to which each alternative could achieve the project purpose and need and objectives, including avoidance and minimization of environmental impacts. Sections 2.1 through 2.4, below, describe the criteria and methods used to evaluate the alternatives in more detail.

### 2.1. HST PROJECT PURPOSE

The purpose of the California HST Project is to implement the statewide HST System in sections along the corridors selected in program-level (Tier 1) decisions that will: (1) link Southern California cities, the Central Valley, Sacramento, and the Bay Area; (2) provide a new transportation option that increases mobility throughout California; (3) provide reliable HST service that delivers predictable and consistent travel times using electric-powered, steel-wheeled trains; and (4) provide a transportation system that is commercially viable.

### **2.1.1. Objectives of the Statewide HST System and Within the Bakersfield to Palmdale Section**

The Authority's statutory mandate is to plan, build, and operate a HST system that is coordinated with California's existing transportation network, particularly intercity rail and bus lines, commuter rail lines, urban rail transit lines, highways, and airports.

The Authority's objective is to provide reliable high-speed service that delivers predictable and consistent travel times. The Bakersfield to Palmdale Section of the HST System will provide greater access and choice of transportation modes, which will increase mobility in the region and contribute to the increased mobility throughout California.

This section of the HST System will connect the San Francisco Bay Area and Sacramento region to the north with the Los Angeles and San Diego metropolitan areas in the south. Design practices will minimize and, if possible, avoid environmental impacts to natural resources, neighborhoods and communities, and agricultural operations along the Bakersfield to Palmdale Section.

The Authority's objectives and policies for the proposed HST system are:

- Provide intercity travel capacity to supplement critically over-used interstate highways and commercial airports.
- Meet future intercity travel demand that will be unmet by present transportation systems and increase capacity for intercity mobility.
- Maximize intermodal transportation opportunities for location stations to connect with local transit, airports, and highways.
- Improve the intercity travel experience for Californians by providing comfortable, frequent, reliable, and safe high-speed travel. Safety includes not only reduced congestion along roadways, but safe travel in the wintertime fog that can pervade the Central Valley.
- Provide a sustainable reduction in travel time between major urban centers.
- Increase the efficiency of the intercity transportation system, and in doing so, reduce greenhouse gas emissions within the Central Valley.
- Maximize the use of existing transportation corridors and rights-of-way, to the extent feasible.
- Develop a practical and economically viable transportation system that can be implemented in phases by 2020 and generate revenues in excess of operations and maintenance costs.

### **2.2. CRITERIA USED TO IDENTIFY ALTERNATIVES TO BE CARRIED FORWARD INTO PROJECT EIR/EIS ANALYSIS**

The intent of the alternatives analysis is to consider a wide range of options and to identify those alternatives to be carried forward into the Bakersfield to Palmdale Project EIR/EIS. Alternatives qualifying for detailed environmental analysis would:

- Meet purpose and need and the project objectives in providing a sustainable reduction in travel time between major urban centers.
- Have no environmental or engineering issues that would make project approvals infeasible.
- Be feasible and practical to construct.
- Reduce or avoid adverse environmental impacts.

## 2.3. HST DESIGN OBJECTIVES

To determine if an alternative meets the HST project purpose and need, alternatives are evaluated using HST system performance criteria that capture design differences and qualities in the alignment and station locations. These objectives and measures are summarized in Table 2-1.

**Table 2-1: Alignment and Station Performance Objectives and Criteria**

Objective	Criteria
Maximize ridership/revenue potential	Travel Time (Minutes) <sup>1</sup>
	Route Length (miles)
Maximize connectivity and accessibility	Intermodal connections
Minimize operating and capital costs	Capital costs
	Operating costs
	Maintenance costs
<sup>1</sup> The critical travel times within the Bakersfield to Palmdale Section are the travel times for the alternatives within the three subsections defined for this analysis. These travel times are tied to the Proposition 1A requirement that HST travel between San Francisco and Los Angeles in 2 hours 40 minutes.	

## 2.4. COMPARISON OF PROJECT ALTERNATIVES

In addition to the HST Project objectives and criteria presented in Sections 2.1 through 2.3, five additional types of measures are used to evaluate and compare project alternatives:

1. **Land Use** – Measures include: supports transit use, is consistent with existing adopted local, regional, and state plans, and is supported by existing and future growth areas (Table 2-2).
2. **Constructability** – Construction of the alternative is feasible in terms of constructability and right-of-way constraints (Table 2-3).
3. **Community Impacts** – Measures of disruption to neighborhoods and communities, including extent to which an alternative minimizes right-of-way acquisitions, minimizes dividing an established community, and minimizes conflicts with community resources (Table 2-4).
4. **Environmental Resources** – Extent to which an alternative minimizes impacts on environmental resources, including agricultural land and operations (Table 2-5).

The evaluation of the alternatives according to these measures is summarized in Section 4.0 of this report.

**Table 2-2: Land Use Evaluation Measures**

Land Use		
Measurement	Method	Source
Development potential for Transit-Oriented Development (TOD) within walking distance of station	Identify existing and proposed land uses within 1/2-mile of station locations. Identify if there are TOD districts, a TOD overlay zones, mixed use designations, or if local jurisdictions have identified station areas for redevelopment or economic development.	Regional and local planning documents and land use analysis and input from local planning agencies.
Consistency with other planning efforts and adopted plans	Qualitative – General analysis of applicable planning and policy documents.	Land use analysis baseline conditions study.

**Table 2-3: Constructability Evaluation Measures**

Constructability and Right-of-Way		
Measurement	Method	Source
Constructability, access for construction, within existing transportation ROW	Extent of feasible access to alignment for construction.	Conceptual design plans and maps.
Disruption to existing railroads	Right-of-way constraints and impacts on existing railroads.	Conceptual design plans and maps.
Disruption to and relocation of utilities	Number of utility diversions.	Conceptual design plans and maps.

**Table 2-4: Community Evaluation Measures**

Avoided or Minimized Disruption to Neighborhoods and Communities		
Measurement	Method	Source
Displacements	Number and acres of parcels by land use type within alignment and station footprint by type of use: agricultural, residential, commercial, and industrial.	Identified comparing the alignment conceptual design drawings with aerial photographs, zoning maps, and General Plan/land use maps.
Properties with access affected	Identify potential locations along the alignments or at stations where access would be affected.	Estimated from conceptual design plans and aerial photographs.
Local traffic effects around stations	Identify potential locations where increases in traffic congestion or erosion of level of service (LOS) are expected to occur.	Existing traffic LOS from local jurisdictions.
Local traffic effects of grade separations	Identify potential locations of at-grade separations where increase in traffic congestion or LOS are expected to occur.	Existing traffic LOS from local jurisdictions.



**Table 2-5: Environmental Resources Evaluation Measures**

<b>Avoided or Minimized Impact on Environmental Resources</b>		
<b>Measurement</b>	<b>Method</b>	<b>Source</b>
Waterways, wetlands, natural preserves, or biologically sensitive habitat areas affected	Identify new bridge crossings required; estimate of acres of wetlands, linear feet of waterways; acres and species of T&E habitat affected; acres of natural areas/critical habitat affected.	Estimated from conceptual design plans and GIS layers.
Cultural resources	Identify locations of properties listed in the National Register of Historic Places or California Historical Resources Information System. For archaeological resources identify areas of high or moderate sensitivity based on previous studies conducted in the study area.	Based on conceptual design plans, GIS layers, Section 4(f) studies, and cultural resource records searches and surveys.
Parklands	Number and acres of parks that could be directly and indirectly affected. This would also include major trails that would be crossed.	Based on conceptual design plans, GIS layers, and Section 4(f) studies.
Agricultural land and operations	Acres of prime farmland, farmland of statewide importance, unique farmland, and farmland of local importance within preliminary limits of disturbance. Effects on other essential agricultural operations (e.g., dairies).	Based on conceptual design plans and GIS layers.
Noise and vibration effects on sensitive receivers	Identify types of land use activities that would be affected by HST pass-by noise and ground vibration.	Results of screening-level assessment: inventory of potential receivers from site survey and aerial maps
Change in visual/scenic resources	Identify number of local and scenic corridors crossed and scenic/visual resources affected by HST elevated structures in scenic areas and shadows on sensitive resources (parks). Identify locations where residential development is in close proximity to elevated HST structures.	Results of general assessment
Maximize avoidance of areas with geological and soils constraints	Identify number of crossings of known seismic faults.	U.S. Geological Survey (USGS) maps and available GIS data
	Acres of encroachment into areas with highly erodible soils.	
	Acres of encroachment into areas with high landslide susceptibility.	
Maximize avoidance of areas with potential hazardous materials	Hazardous materials/waste constraints (number and types of sites).	Data from previous records search conducted for other projects within study area

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### 3.0 PROJECT ALTERNATIVES

This section first describes the No Project Alternative established to address state and federal environmental requirements and then explains the outcomes of the Statewide Program EIR/EIS, which provided the basis for the initiation of the AA process in the Bakersfield to Palmdale Section. It then outlines the two-step process used to define and review an initial set of alternatives. Finally, it describes the alternatives that were carried forward for detailed analysis in Section 4.0 of this report based on this review.

#### 3.1. NO PROJECT ALTERNATIVE

The No Project Alternative is the reasonably foreseeable future condition absent the HST system. The No Project Alternative represents the state's transportation system (highways, air, and conventional rail) as it is currently and as it would be after implementation of programs or projects that are currently identified in regional transportation plans (RTPs), have identified funds for implementation, and are expected to be in place by 2035, the environmental study's horizon year. The level of infrastructure improvement (based on expected federal, state, regional, and local funding) was analyzed in consideration of the growth in population and transportation demand projected to occur by 2035. The future improvements that would be part of the No Project Alternative are also included under the HST "Build" Alternatives as part of the future 2035 baseline.

The No Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed. It is based on the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs)
- State of California Office of Planning and Research CEQAnet Database
- Airport Master Plans
- City and county general plans and interviews with planning officials
- Intercity passenger rail plans

The No Project Alternative is described more fully in Appendix C.

#### 3.2. PROGRAM ALTERNATIVES

##### 3.2.1. Statewide Program Alternatives

The Statewide Program EIR/EIS for the HST system was completed in November 2005. The Authority and FRA selected the technology for the HST vehicles and identified potential route and station options through the program environmental analysis. The Statewide Program EIR/EIS examined three major alternatives for the statewide transportation network. They were as follows:

- No Project Alternative – The state's transportation network as it is today, along with funded projects included in regional transportation plans.
- Modal Alternative – Enhancements to the state's transportation network using existing modes and technologies (mainly expanded airports and highways).
- High-Speed Train Alternative – A new high-speed train system to connect California's major urban centers.

The HST Alternative was the selected system alternative in the Statewide Program EIR/EIS. The No Project Alternative was not able to provide the needed level of intercity mobility in the future, and the Modal Alternative provided reduced mobility compared to the HST Alternative. Furthermore, the Modal Alternative would have a higher cost than the HST Alternative, and more substantial environmental impacts.

Figure 3-1 illustrates the Bakersfield to Palmdale Section alignments evaluated in the Program FEIR/EIS.

### 3.2.2. Bakersfield to Palmdale Section Routing and Station Alternatives

The Statewide Program EIR/EIS evaluated the region of southern California, which encompasses the southern portion of the Central Valley south of Bakersfield, the mountainous areas between the Central Valley and the Los Angeles basin, and the northern portion of the Los Angeles basin from Sylmar to downtown Los Angeles. At the conclusion of the Statewide Program EIR/EIS, the Authority and FRA defined a broad corridor between Bakersfield and Los Angeles, which was further divided into two segments: 1) Bakersfield to Sylmar; 2) Sylmar to Los Angeles. In turn, as part of the project-level environmental review process, the Bakersfield to Sylmar segment was further subdivided into Bakersfield to Palmdale Section.

The screening evaluation conducted as part of the Statewide Program EIR/EIS considered six general alignment corridors for the Bakersfield to Sylmar segment:

- SR-138 (Soledad Canyon or SR-14)
- Aqueduct (Soledad Canyon or SR-14)
- I-5 via Comanche Point
- I-5 2.5% (Union Avenue or Wheeler Ridge)
- I-5 3.5% (Union Avenue or Wheeler Ridge)
- SR-58/Soledad Canyon

As a result of the screening evaluation, the SR-138, Aqueduct, I-5 via Comanche Point, and I-5 2.5% corridors were eliminated from study in the Statewide Program EIR/EIS. These alignments were eliminated based on seismic constraints, as each would require long tunnels through seismic zones, either crossing active faults or paralleling them for long distances. Of the remaining alignments, the SR-58/Soledad Canyon Corridor (Antelope Valley), was identified as the preferred alignment because it would have fewer potential environmental impacts, be less subject to seismic activity, and have considerably less tunneling (and, thus, fewer constructability issues and lower construction costs) than the I-5 3.5% alignment options (i.e., Union Avenue or Wheeler Ridge).

Table 3-1 lists each of the alternatives/stations considered in the Statewide Program EIR/EIS, whether or not they were carried forward for further study, and the reasons for elimination.

**Table 3-1: Alternatives Considered in 2005 Statewide Program EIR/EIS**

Alternatives/ Stations	Program EIR/EIS Decision		Notes
	Carried Forward	Not Carried Forward	
SR-138		Eliminated during the evaluation of alternatives process.	Eliminated due to seismic constraints.
Aqueduct		Eliminated during the evaluation of alternatives process.	Eliminated due to lengthy run adjacent and parallel to San Andreas fault zone, seismic constraints.
I-5 via Comanche Point		Eliminated during the evaluation of alternatives process.	Eliminated due to seismic constraints.
I-5 Union Avenue Corridor	Carried forward during the evaluation of alternatives process; however, was not selected as preferred alignment.		2005 EIS/EIS found that both I-5 Corridor options would have more potential environmental impacts, be subject to more seismic activity, and have considerably more tunneling and thereby more constructability issues than SR-58/Soledad Canyon.
I-5 Wheeler Ridge Corridor	Carried forward during the evaluation of alternatives process; however, was not selected as preferred alignment.		
<b>SR-58/Soledad Canyon (Antelope Valley) Corridor</b>	<b>Preferred in 2005 EIR/EIS, applied to Bakersfield to Palmdale Section</b>		
Station Locations: Santa Clarita-5 options (SR-126/I-5; Magic Mountain Parkway/I-5; The Old Road/I-5 proposed sites)		Eliminated during the evaluation of alternatives process	Impracticable due to logistical constraints, inability to avoid or substantially reduce environmental impacts; did not meet project objectives due to insufficient connectivity; severe right-of-way constraints and high construction issues.
Station Locations: Santa Clarita SR-14 options (via Princessa/SR-14; San Fernando Road/SR-14 proposed sites)		Eliminated during the evaluation of alternatives process	Impracticable logistical constraints; poor access to existing roadways and impracticable high construction issues and costs.
Station Location: Lancaster Metrolink Station		Eliminated during the evaluation of alternatives process	Did not meet project objectives, providing poor connectivity and ridership potential due to distance from Palmdale Airport, bus service and planned Metrolink stop.
Station Location: Palmdale Airport/Transportation Center	Preferred in 2005 EIR/EIS as station option to serve the Antelope Valley population		Located outside of the Bakersfield to Palmdale Section Study Area; Studied in the Palmdale to Los Angeles Section
Station Location: Sylmar Metrolink	Preferred in 2005 EIR/EIS as station option to serve the San Fernando Valley, Simi Valley and Newhall/Santa Clarita areas		Located outside of the Bakersfield to Palmdale Section Study Area; Studied in the Palmdale to Los Angeles Section
EIR/EIS = Environmental Impact Report/Environmental Impact Statement			

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**LEGEND**

- Station Location Areas
- PEIR Alternatives
  - Carried Forward
  - Eliminated
- Existing Rail Lines
- County Boundary
- Census Designated Place

The map displays the proposed high-speed rail routes between Bakersfield and Palmdale. The routes are color-coded: blue for 'Carried Forward' and red for 'Eliminated'. The map includes the following labels and features:

- Stations:** PROPOSED BAKERSFIELD STATION and PROPOSED PALMDALE STATION.
- Counties:** KERN COUNTY, LOS ANGELES COUNTY, and VENTURA COUNTY.
- Highways:** SR-58, SR-138, SR-14, SR-99, SR-204, SR-178, SR-184, SR-223, SR-140, SR-141, SR-142, SR-143, SR-144, SR-145, SR-146, SR-147, SR-148, SR-149, SR-150, SR-151, SR-152, SR-153, SR-154, SR-155, SR-156, SR-157, SR-158, SR-159, SR-160, SR-161, SR-162, SR-163, SR-164, SR-165, SR-166, SR-167, SR-168, SR-169, SR-170, SR-171, SR-172, SR-173, SR-174, SR-175, SR-176, SR-177, SR-178, SR-179, SR-180, SR-181, SR-182, SR-183, SR-184, SR-185, SR-186, SR-187, SR-188, SR-189, SR-190, SR-191, SR-192, SR-193, SR-194, SR-195, SR-196, SR-197, SR-198, SR-199, SR-200, SR-201, SR-202, SR-203, SR-204, SR-205, SR-206, SR-207, SR-208, SR-209, SR-210, SR-211, SR-212, SR-213, SR-214, SR-215, SR-216, SR-217, SR-218, SR-219, SR-220, SR-221, SR-222, SR-223, SR-224, SR-225, SR-226, SR-227, SR-228, SR-229, SR-230, SR-231, SR-232, SR-233, SR-234, SR-235, SR-236, SR-237, SR-238, SR-239, SR-240, SR-241, SR-242, SR-243, SR-244, SR-245, SR-246, SR-247, SR-248, SR-249, SR-250, SR-251, SR-252, SR-253, SR-254, 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SR-630, SR-631, SR-632, SR-633, SR-634, SR-635, SR-636, SR-637, SR-638, SR-639, SR-640, SR-641, SR-642, SR-643, SR-644, SR-645, SR-646, SR-647, SR-648, SR-649, SR-650, SR-651, SR-652, SR-653, SR-654, SR-655, SR-656, SR-657, SR-658, SR-659, SR-660, SR-661, SR-662, SR-663, SR-664, SR-665, SR-666, SR-667, SR-668, SR-669, SR-670, SR-671, SR-672, SR-673, SR-674, SR-675, SR-676, SR-677, SR-678, SR-679, SR-680, SR-681, SR-682, SR-683, SR-684, SR-685, SR-686, SR-687, SR-688, SR-689, SR-690, SR-691, SR-692, SR-693, SR-694, SR-695, SR-696, SR-697, SR-698, SR-699, SR-700, SR-701, SR-702, SR-703, SR-704, SR-705, SR-706, SR-707, SR-708, SR-709, SR-710, SR-711, SR-712, SR-713, SR-714, SR-715, SR-716, SR-717, SR-718, SR-719, SR-720, SR-721, SR-722, SR-723, SR-724, SR-725, SR-726, SR-727, SR-728, SR-729, SR-730, SR-731, SR-732, SR-733, SR-734, SR-735, SR-736, SR-737, SR-738, SR-739, SR-740, SR-741, SR-742, SR-743, SR-744, SR-745, SR-746, SR-747, SR-748, SR-749, SR-750, SR-751, SR-752, SR-753, SR-754, SR-755, SR-756, SR-757, SR-758, SR-759, SR-760, SR-761, SR-762, SR-763, SR-764, SR-765, SR-766, SR-767, SR-768, SR-769, SR-770, SR-771, SR-772, SR-773,

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### **3.2.3. Selected Program Preferred Alternative and Station Locations for the Bakersfield to Palmdale Section**

The SR-58/Soledad Canyon Corridor is reflected in the Bakersfield to Palmdale Section Program EIR/EIS Preferred Alignment, which generally follows the route of UPRR between Bakersfield and Edison and SR-58 from Caliente Creek to Tehachapi and Proctor Lake. East of Proctor Lake at Cameron, the alignment turns south of SR-58 and converges with the UPRR north of Rosamond, traveling through Rosamond, Lancaster and Palmdale within the UPRR right-of-way. The Program EIR/EIS Preferred Alignment for the Bakersfield to Palmdale Section is discussed in more detail in Section 3.3, in which the alternatives are described by subsection (Edison, Tehachapi, and Antelope Valley).

As defined in Section 1.3 and in Table 3-1, HST stations are proposed for Bakersfield and Palmdale, but not in between (i.e., the Bakersfield to Palmdale Section).

### **3.3. INITIAL DEVELOPMENT OF PROJECT ALTERNATIVES**

For each subsection of the Bakersfield to Palmdale Section, the Authority conducted agency and community outreach to help identify alternatives for further development as part of the project-level environmental process. An initial evaluation of alternatives was conducted to narrow the range of alternatives to be evaluated in detail, resulting in four alternatives in the Edison Subsection, four alternatives in the Tehachapi Subsection, and five alternatives in the Antelope Valley Subsection.

The initial alignment alternatives for the Alternatives Analysis were based on the Statewide Program EIR/EIS Preferred Alignment and alternatives proposed during public scoping. With the exception of the Tehachapi subsection, all alternatives considered in the Bakersfield to Palmdale Section were developed within a fairly narrow corridor generally paralleling the path of the Program EIR/EIS Preferred Alignment.

Throughout this report, the term “alternatives” describes end-to-end alignments that traverse an entire subsection, such as from Oswell Street in East Bakersfield to Caliente Creek in the Tehachapi foothills for the Edison subsection. The term “options” refers to local variations within an alternative, such as different profiles along the same alignment or routes that bypass critical natural resources or land uses.

In several sections of this report, the potential impacts on railroad rights-of-way are discussed. The analysis of such impacts often refers to the “nominal” railroad right-of-way, which is the 100-foot wide corridor that the railroads have stated is required to carry out their operations. The alignments discussed in this report have typically been designed to avoid the 100-foot nominal right-of-way, but not railroad-owned property beyond the 100-foot operational corridor.

In conjunction with the evaluation and refinement of initial alternatives, an engineering review was performed on the Program EIR/EIS Preferred Alignment to interpret its alignment and evaluate its consistency with the project engineering design criteria, which were published following publication of the Statewide Program EIR/EIS in 2005. This review concluded that the Program EIR/EIS Preferred Alignment, as interpreted, was not consistent with the design criteria as specified in the Technical Memorandum – Alignment Design Standards for High-Speed Train Operation TM 2.1.2 (April 4, 2009). The inconsistencies were as follows:

- The maximum slope of the interpreted Program EIR/EIS Preferred Alignment was 4.8%, which exceeded the specified maximum of 3.5%.
- The maximum sustained slopes of the interpreted Program EIR/EIS Preferred Alignment of 3.5% for 8 miles, and 3.2% for 8 miles exceeded the specified limits for slopes identified in the engineering criteria, which state that the average slope for any 3.7 mile long section of the line will be under 3.5% and the average slope for any 6.2 mile long section of the line will be under 2.5%.

- The minimum curve radius of 16,000 feet at four locations is less than the absolute radius allowed to permit 220 mph HST operating speeds (the engineering guidelines allow 19,500 feet exceptional curve radius at 220 mph).

In addition, the Program EIR/EIS Preferred Alignment required two crossings of SR-58, crossing Tehachapi Creek and the UPRR in a narrow canyon, and crossing the Garlock Fault on structure, all of which were either costly or infeasible according to the project design guidelines.

As a result of the inconsistencies described above, the Program EIR/EIS Preferred Alignment, as interpreted, was not carried forward for detailed evaluation. The alignment alternatives that were carried forward are, however, essentially variations on the Program EIR/EIS Preferred Alignment, with adjustments to conform to project engineering design criteria. The alternatives considered for each of the Bakersfield to Palmdale subsections are described in Sections 3.3.1 through 3.3.3.

### **3.3.1. Edison Subsection**

The Edison Subsection alignment alternatives begin at Edison Highway and Oswell Street, on the west end at a common point shared with the alignments in the Fresno to Bakersfield Section, and continue southeast either north of the community of Edison or along the SR-58 right-of-way, before connecting to the Tehachapi subsection in the vicinity of Caliente Creek.

#### **A. Development of Initial Alternatives**

This section describes the initial alternatives developed for the Edison Subsection with input from the community and a technical working group (TWG) composed of public agency representatives who shared their expertise and local knowledge in developing and refining alternatives. The result was a set of four initial alternatives (E1, E2, E3, and E4), all of which were based on the Statewide Program EIR/EIS Preferred Alignment in that they closely paralleled the major transportation corridors in this area, the UPRR rail alignment, and SR-58. The alternatives reflect greater engineering detail in their relationship to nearby rights-of-way, fixed features, and planned development than those considered in the Statewide Program EIR/EIS. The initial alternatives are as follows:

- Alternative E1 passes north of the community of Edison, crossing the UPRR right-of-way (ROW) and traveling through agricultural land.
- Alternative E2 is aligned immediately north of and as close as possible to the SR-58 ROW in order to minimize impacts to agriculture. This would require modifications to SR-58 facilities. The E2 alignment was further refined with the development of two profile options E2A (partially at-grade) and E2B (entirely elevated).
- Alternative E3 was developed to avoid agricultural lands surrounding Edison by being located within the SR-58 median. This would require modifications to SR-58 facilities.
- Alternative E4 was developed to avoid prime agricultural land by remaining adjacent to Edison Highway and traveling through the community of Edison. By being next to Edison Highway, E4 could disrupt truck circulation into and out of the many agricultural processing and shipping businesses that line the highway.

All alternatives, except for E2A, would remain elevated throughout this subsection. The initial alternatives, including the two profile variations for E2, are shown in Figure 3-2.

#### **B. Evaluation and Refinement of Initial Alternatives**

As indicated above, the initial alternatives were reviewed to determine if they met the project purpose and need, produced substantial impact on community resources, conflicted with approved future

development in the study area, or deviated from desired design performance standards. They were then evaluated against engineering design, constructability, community, and natural resource impact criteria as defined in the *Alternatives Analysis Methods for Project EIR/EIS Technical Memorandum Version 2* (October 2009).

Table 3-2 summarizes the screening and evaluation of the initial alternatives, highlighting the key aspects and results of the evaluation, indicating which alternatives were carried forward into the full alternatives analysis, and which were eliminated from further consideration.

### **C. Alternatives Carried Forward for Detailed Analysis**

Based upon the initial alternatives evaluation results, the Authority and FRA carried forward the following alternatives/options for further study:

- Alternatives E2A and E2B – SR-58 Adjacent North Side
- Alternative E3 – In SR-58 Median
- Alternative E4 – Along Edison Highway

As described in Table 3-2, Alternative E1 was eliminated from consideration because it would traverse multiple Williamson Act-designated agricultural and open space lands, could sever agricultural lands and the road access to these parcels, and would require construction of two crossovers over the UPRR that could require column construction within the nominal railroad ROW.

These alternatives that were carried forward for detailed evaluation (see Figure 3-3) are designed in accordance with the Authority's engineering design standards, including such parameters as horizontal curve radius and minimal variation in slope. Most importantly, design of the entire section is intended to enable operations speeds of 220 mph, which will facilitate travel times of no more than 2 hours and 40 minutes between San Francisco and Los Angeles. More detailed descriptions of each alternative carried forward are provided below.

#### **Alternative E2A – SR-58 Adjacent North Side (Partially At-Grade)**

Alternative E2A runs predominantly adjacent to the north side of SR-58 and travels generally from west-to-east on partially at-grade and elevated segments. This option has approximately 5.5 miles of elevated structure, no tunneled segments, and an average slope of 0.9%. It shares an elevated alignment within the Edison Highway right-of-way from Oswell Street to Weedpatch Highway. The elevated structure is sufficiently high (45 feet) to avoid conflicts with existing overcrossings of Edison Highway and the UPRR, but could require redesign of Edison Highway to accommodate, rather than displace, adjacent businesses. East of Weedpatch Highway, Alternative E2A remains elevated and curves southeast, becoming parallel with SR-58 on the north side, thereby avoiding the community of Edison on the south. Along SR-58, Alternative E2A returns to grade, displacing the agricultural activities alongside SR-58 and three SR-58 interchanges at Edison Road, Comanche Drive, and Tower Line Road. At Caliente Creek, the alignment would ascend to a 200-250 foot high elevated structures to cross the creek and tie-in with the Tehachapi Subsection alternatives.

#### **Alternative E2B– SR-58 Adjacent North Side (All Elevated)**

Alternative E2B runs adjacent to the north side of SR-58 on an entirely on elevated structure and has an average slope of 0.9%. In the segment between Vineland Road and Caliente Creek, the elevated alignment allows the potential to continue agricultural activities adjacent to and underneath the structure. By remaining on elevated structure, Alternative E2B would avoid major impacts to SR-58 and its interchanges. At Caliente Creek, the alignment would ascend to 200-250 foot high elevated structures to cross the creek and tie-in with the Tehachapi Subsection alternatives.

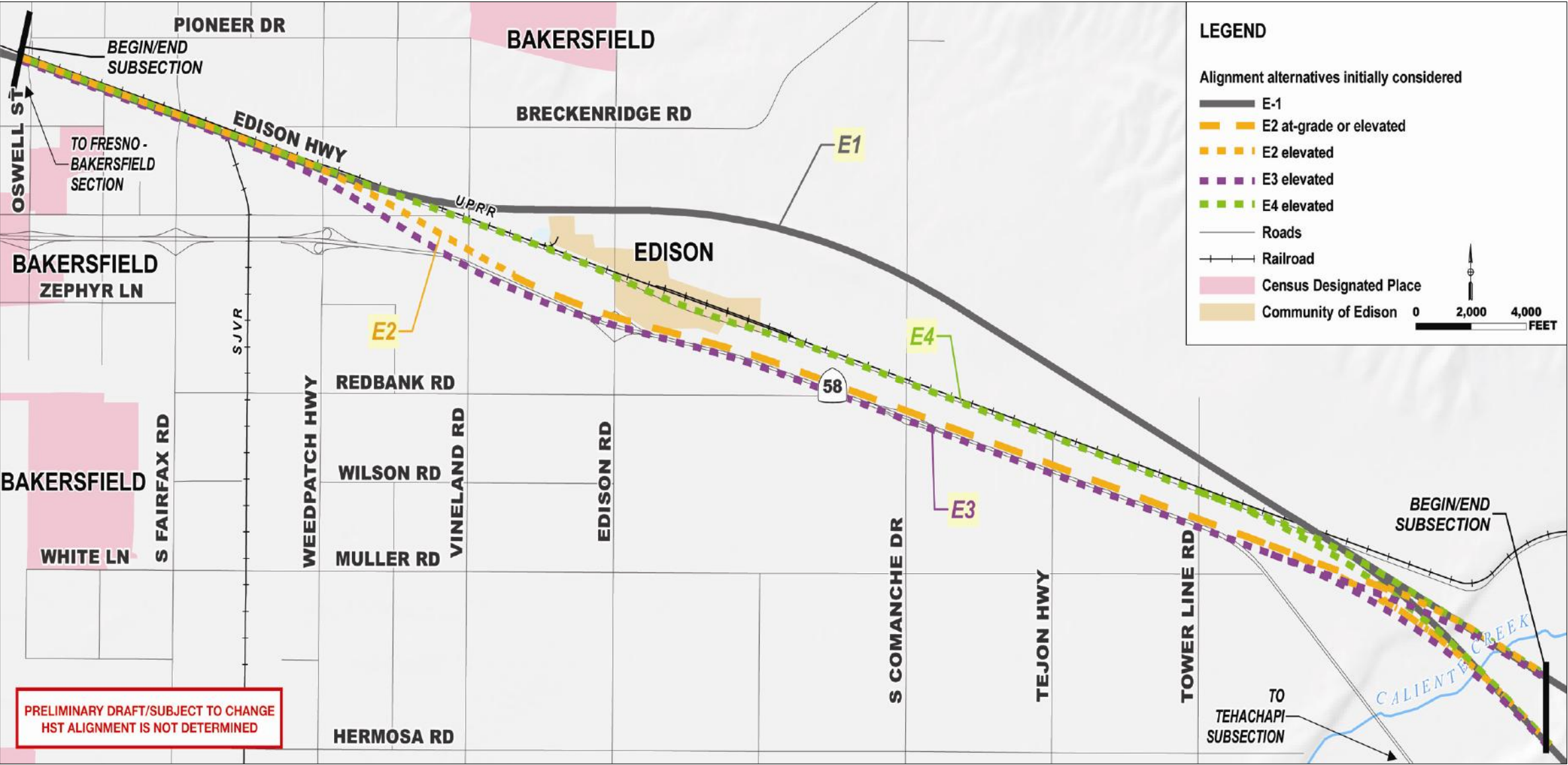
### **Alternative E3 – In SR-58 Median**

Alternative E3 runs predominantly within the SR-58 median, travels generally from west-to-east entirely on elevated structure, and has an average slope of 0.9%. It shares an elevated alignment within the Edison Highway right-of-way from Oswell Street to Weedpatch Highway. The elevated structure is sufficiently high (45 feet) to avoid conflicts with existing overcrossings of Edison Highway and the UPRR, but could require the redesign of Edison Highway to accommodate, rather than displace, adjacent businesses. East of Weedpatch Highway, Alternative E3 remains elevated, traveling in the median of SR-58 from Vineland Road to Tower Line Road. It would, thereby, avoid agricultural land north of SR-58, but would require the realignment of SR-58 between Vineland Road and Malaga Road to comply with HST design criteria. At Caliente Creek, the alignment would ascend to 200-250 foot high elevated structures to cross the creek and tie-in with the Tehachapi Subsection alternatives.

### **Alternative E4 – Along Edison Highway**

E4 runs predominantly along Edison Highway, travels generally west-to-east entirely on elevated structure, and has an average slope of 0.9%. It shares an elevated alignment within the Edison Highway right-of-way from Oswell Street to Weedpatch Highway. The elevated structure is sufficiently high (45 feet) to avoid conflicts with existing overcrossings of Edison Highway and the UPRR, but could require the redesign of Edison Highway to accommodate, rather than displace, adjacent businesses. East of Weedpatch Highway, Alternative E4 continues elevated along Edison Highway to the community of Edison. It then passes through Edison on the south side of the Edison Highway, traversing the edge of Edison Middle School but avoiding a low-income residential neighborhood to the south. Through the community of Edison, Edison Highway would be realigned slightly north to parallel the E4 alignment. The alignment then passes adjacent to agricultural packing and shipping facilities along Edison Highway without displacing these facilities. Column placement could, however, affect access to and from these facilities. E4 continues on the south side of the highway before diverting to SR-58 east of Tower Line Road. At Caliente Creek, the alignment would ascend to 200-250 foot high elevated structures to cross the creek and tie-in with the Tehachapi Subsection alternatives.

Figure 3-2: Edison Subsection Initial Alternatives





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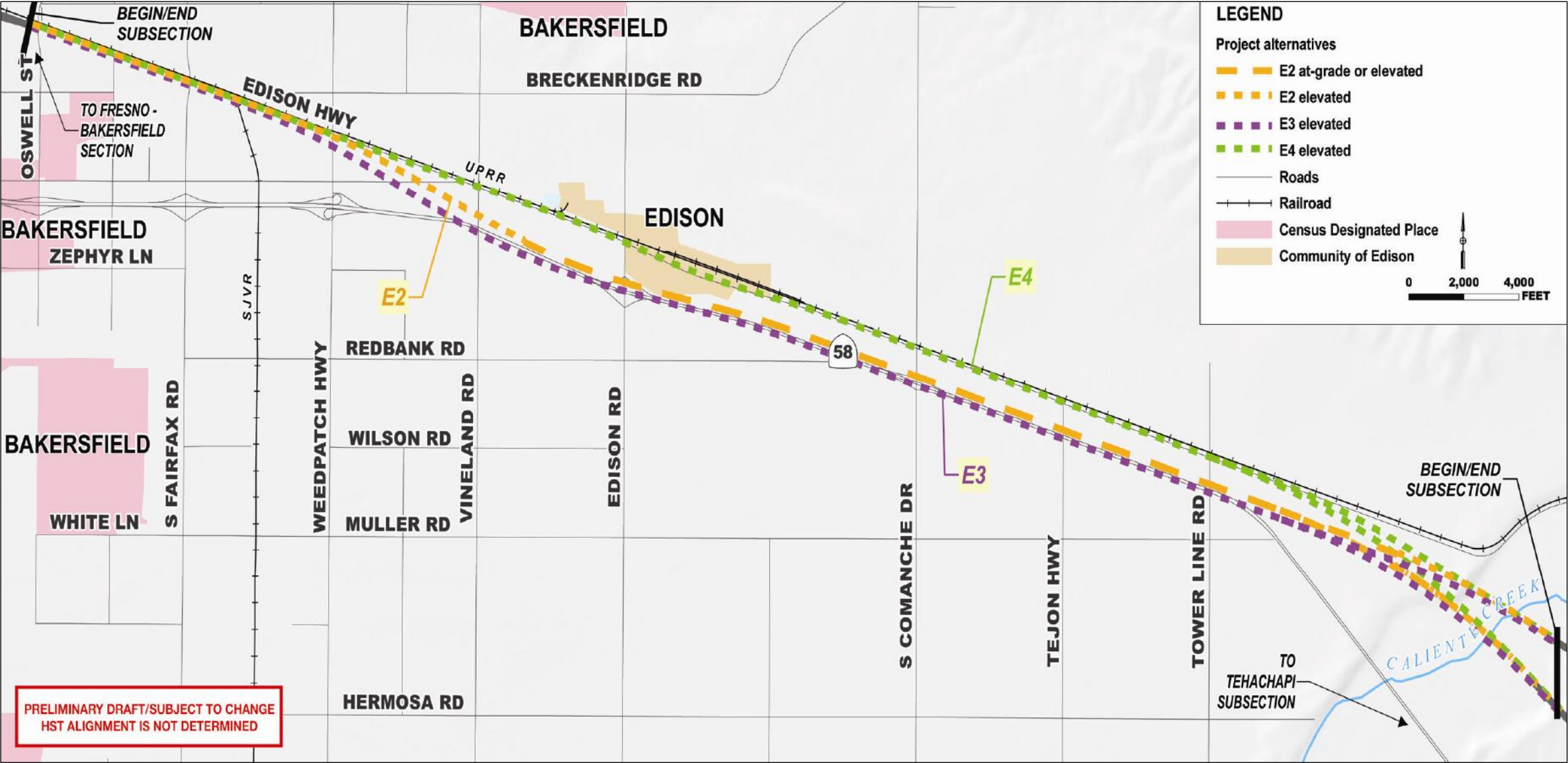
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**Table 3-2: Evaluation Results of Initial Alternatives – Edison Subsection**

Initial Alternative Name	Evaluation Comments	Carried Forward for Detailed Analysis?
<b>E1</b> – North of Edison Highway	Three major concerns for E1 include: 1) the alignment traverses multiple Williamson Act-designated agricultural and open space lands, 2) the at-grade profile north of Edison potentially severs agricultural lands and the road access to these parcels, and 3) the alignment requires construction of two crossovers over the UPRR that could require column construction within the nominal railroad ROW. For these reasons, this alternative was eliminated.	No
<b>E2</b> – SR-58 Adjacent North Side <ul style="list-style-type: none"> <li><b>E2A:</b> Partially At-Grade</li> <li><b>E2B:</b> All Elevated</li> </ul>	E2A and E2B traverse farmlands west and south of Edison but limit the displacement of agricultural operation by remaining close to the SR-58 ROW. As a result, E2 had no major constructability issues or engineering constraints, although cost of the elevated structures and the effect of the at grade alignment on the SR-58 interchange was a concern. Both E2 options were carried forward for further refinement and analysis.	Yes (both options)
<b>E3</b> – In SR-58 Median	E3 limits agricultural impacts by remaining in the median of SR-58, which made it appealing to agricultural stakeholders. Although coordination with Caltrans to secure approval for building in the SR-58 ROW was a concern, use of public ROW and minimizing agricultural impacts made this alternative viable for being carried forward.	Yes
<b>E4</b> – Along Edison Highway	E4 minimizes agricultural impacts by maintaining a path along the south side of Edison Highway that is primarily within an undeveloped strip of land. Although truck circulation at local enterprises was a concern, E4 could provide the opportunity to redesign Edison Highway to improve existing safety and circulation problems, and was therefore considered worthwhile pursuing.	Yes

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Figure 3-3: Edison Subsection Alternatives Carried Forward for Detailed Analysis



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### 3.3.2. Tehachapi Subsection

The Tehachapi Subsection alternatives connect with the Edison Subsection at Caliente Creek and continue southeast through the Tehachapi Mountains before traversing the desert to connect with the Antelope Valley Subsection alternatives west of Mojave near Purdy Avenue.

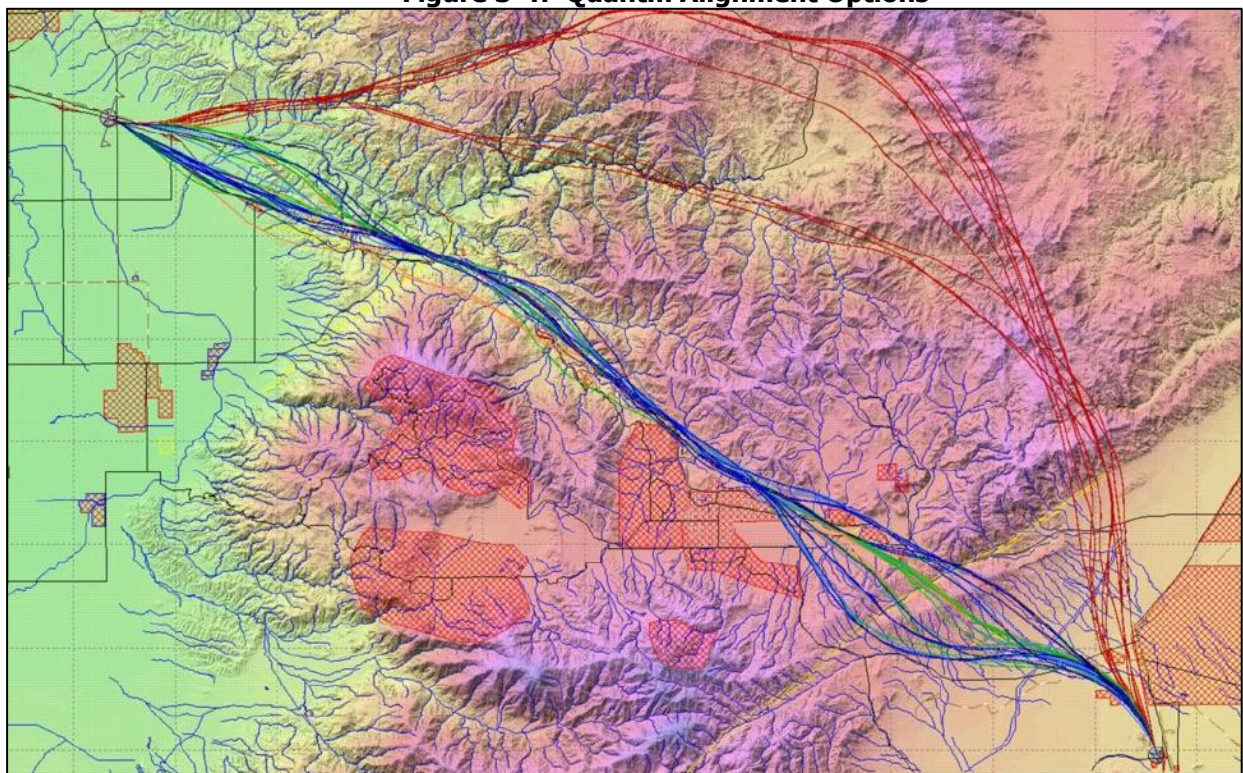
#### A. Development of Initial Alternatives

This section describes the initial alternatives developed for the Tehachapi Subsection with input from the community and a technical working group (TWG) composed of public agency representatives who shared their expertise and local knowledge in developing and refining alternatives. In addition, Quantm alignment optimization software was employed to develop and evaluate routing options.

The initial alternatives were based on the Program EIR/EIS Preferred Alignment through the Tehachapi Mountains, albeit with greater engineering detail regarding rights-of-way, fixed features, and planned development.

The process of developing initial alignment alternatives for the Tehachapi Subsection started with the identification of a refined program alignment, Alternative T2. This alignment was the basis for further refinements using Quantm. The software identified pathways through the mountains that could maintain design criteria, including acceptable slopes, while containing construction costs. The initial output generated over 50 alignments that spanned a distance of 16 miles from north to south, primarily along three major paths of travel through using a combination of tunnel, elevated, and at-grade sections that varied in cost and complexity of construction. Figure 3-4 shows the range of Quantm-generated alignment options.

**Figure 3-4: Quantm Alignment Options**

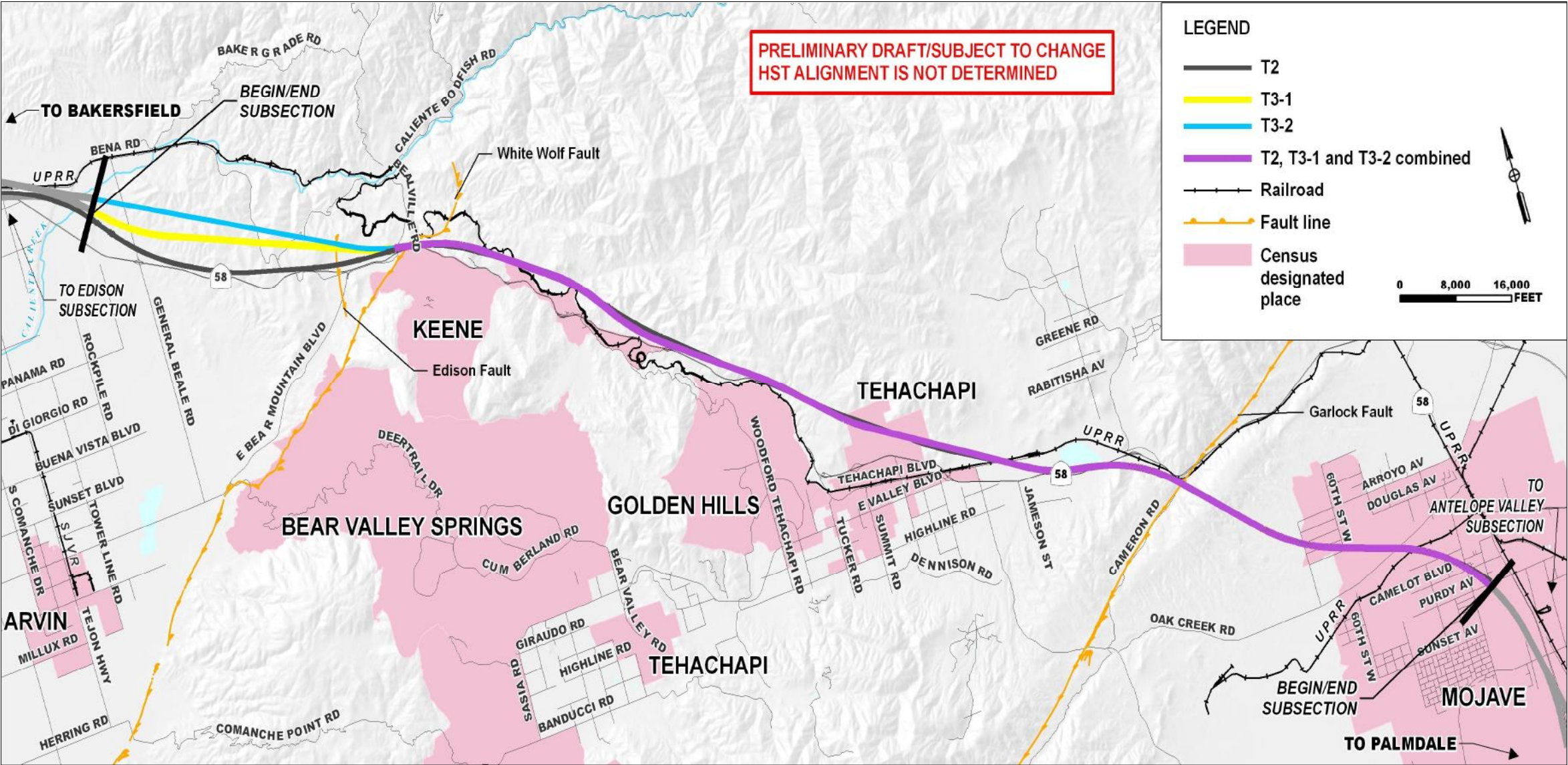


Of the potential major paths of travel identified by Quantm, those running parallel to the Program EIR/EIS Preferred Alignment along the SR-58 corridor were found to offer the best construction and operating environment in terms of access, constructability, and environmental issues. Of the multitude of alignment choices in the SR-58 corridor, the three that minimized tunnel length and the number of elevated structures (the greatest contributors to construction complexity and cost) were found to be the most cost-effective. These new alignments, named T3 alternatives (T3-1 and T3-2), share the same general horizontal configuration, but have different profiles. Slope is the primary differentiator among the various T3 alternatives, both in terms of average slope and maximum sustained slope.

Alternatives T2, T3-1, and T3-2 were refined based on input from the TWG and other local stakeholders and evaluated. The results are shown in Figure 3-5.



Figure 3-5: Tehachapi Subsection Initial Alternatives



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## B. Evaluation and Refinement of the Initial Alternatives

The initial alternatives were reviewed to determine if they met the project purpose and need, produced substantial impact on community resources, conflicted with approved future development in the study area, or deviated from desired design performance standards. They were then evaluated against engineering design, constructability, community, and natural resource impact criteria as defined in the *Alternatives Analysis Methods for Project EIR/EIS Technical Memorandum Version 2* (October 2009).

Table 3-3 summarizes the screening and evaluation of the initial alternatives, highlighting the key aspects and results of the evaluation and indicating which alternatives were carried forward into the full alternatives analysis and which were eliminated from further consideration.

**Table 3-3: Evaluation Results of Initial Alternatives – Tehachapi Subsection**

Initial Alternative Name	Evaluation Comments	Carried Forward for Detailed Analysis?
<b>T2</b> – Refined Program Alignment, Exceeding a 3.5% Slope, Extensive Tunneling	T2 was steeper than the slope existing rolling stock could sustain over the incline section (exceeding a 3.5% slope) and required more tunneling than desired. As a result, T2 was not carried forward for further consideration.	No
<b>T3-1</b> – 2.65% Average Slope, Sustained Slope of 2.75% Over 12 miles	T3-1 accommodated Authority slope requirements and reduced tunneling costs without creating substantial impacts on natural or community resources. It was carried forward for further study.	Yes
<b>T3-2</b> – 2.5% Average Slope, Sustained Slope of 2.5% Over 20 miles	T3-2 also accommodated Authority slope requirements and reduced tunneling costs without creating substantial impacts on natural or community resources. It was carried forward for further study.	Yes

In response to questions concerning power supply to the trains, the T3 alternatives were examined to determine if traction power facilities could be integrated into the western incline section of the Tehachapi Mountains between Caliente Creek and the City of Tehachapi. As a result of this examination, the T3 alternatives were modified to include a relatively flat section for nearly one mile to accommodate a very short stretch of track where electric power to the HST system switches from one source to another (a phase break). The modified alternatives were named T3-B and T3-2B.

Alternative T3-1 provided the basis for development of Alternative T3-B, which addresses traction power, or phase break, requirements by providing a combination of at-grade, elevated, and tunnel configurations to traverse the mountains and meet current horizontal alignment design standards.

Alternative T3-2 was the basis for Alternative T3-2B, which addresses phase break requirements, providing a combination of at-grade, elevated, and tunnel configurations to traverse the mountains and meet current horizontal alignment design standards. In addition, Alternative T3-2B was realigned east of the City of Tehachapi to provide a more direct path through the desert to Purdy Avenue in Mojave.

### C. Alternatives Carried Forward for Detailed Analysis

Based upon the initial alternatives evaluation results, the Authority and FRA carried forward the following alternatives/options for further study:

- Alternative T3-1 – Quantm-Generated Alignment
- Alternative T3-2 – Modified Quantm-Generated Alignment
- Alternative T3-B –Phase Break Alignment
- Alternative T3-2B – Revised Phase Break Alignment

These alignment routes for these alternatives are shown in Figure 3-6 and the vertical profiles for the alternatives are illustrated in Figure 3-7. As Figure 3-7 shows, the variations in profile among the four alternatives are pronounced in the western incline of the Tehachapis between Caliente Creek and the City of Tehachapi. It should be noted that every alternative was designed in accordance with the Authority's design standards, including such parameters as horizontal curve radius, maximum slope, and length of tunnels and elevated sections. Most importantly, the alternatives can accommodate design speeds of 220 mph.

#### Alternative T3-1 – Quantm-Generated Alignment

Alternative T3-1 has a 2.65% average slope and a 2.75% sustained slope over 12 miles. It connects with the Edison Subsection alternatives at the midpoint of the Caliente Creek on an elevated structure. At this point, T3-1 is roughly parallel and three-quarters of a mile to the north of SR-58. Alternative T3-1 maintains a steady slope of 2.5% from Caliente Creek until just east of the White Wolf Fault in a combination of at-grade, tunnel, and elevated configurations. East of the White Wolf Fault, the slope steepens slightly to 2.7% as it ascends through the mountains to the City of Tehachapi (refer to Figure 3-6). As it passes north of the city of Tehachapi, the alignment flattens and remains at grade.

After crossing Tehachapi Boulevard, Alternative T3-1 crosses over SR-58 on a short elevated structure and moves to the south side of SR-58. At Cameron Canyon Road, it crosses the Garlock Fault at-grade and enters an approximately 3.5-miles tunnel. Descending the hillside, Alternative T3-1 is on a berm, except where it crosses over a UPRR spur line serving a cement mining plant. The alignment returns to grade as it curves south and connects to the Antelope Valley Subsection alternatives at Purdy Avenue in Mojave.

#### Alternative T3-2 – Modified Quantm-Generated Alignment

Alternative T3-2 largely shares the same horizontal configuration as Alternative T3-1, but varies in profile, with a 2.5% average slope and a 2.5% sustained slope over 20 miles. Alternative T3-2 generally stays at a higher elevation on the ascent from Caliente Creek to the summit at Tehachapi, which results in the additional length on elevated structure.

East of the Edison Subsection at Caliente Creek, Alternative T3-2 is on an elevated structure, approximately 1.25 miles north of SR-58. It maintains a steady slope of 2.5% in a combination of at-grade, tunnel, and elevated configurations from Caliente Creek to just north of the City of Tehachapi (see Figure 3-6). Alternative T3-2 has the same plan and profile as Alternative T3-1 from the City of Tehachapi to Purdy Avenue in Mojave.



Figure 3-6: Tehachapi Subsection Alternatives Carried Forward for Detailed Analysis

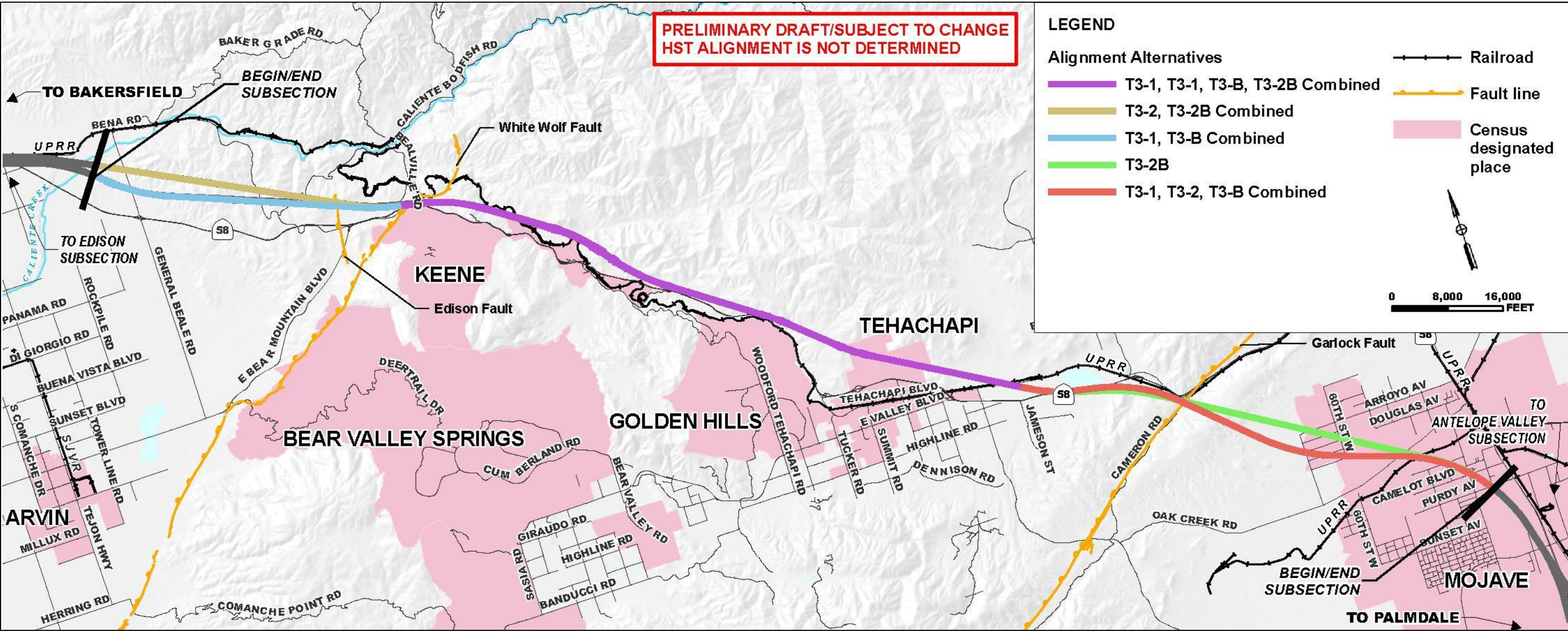
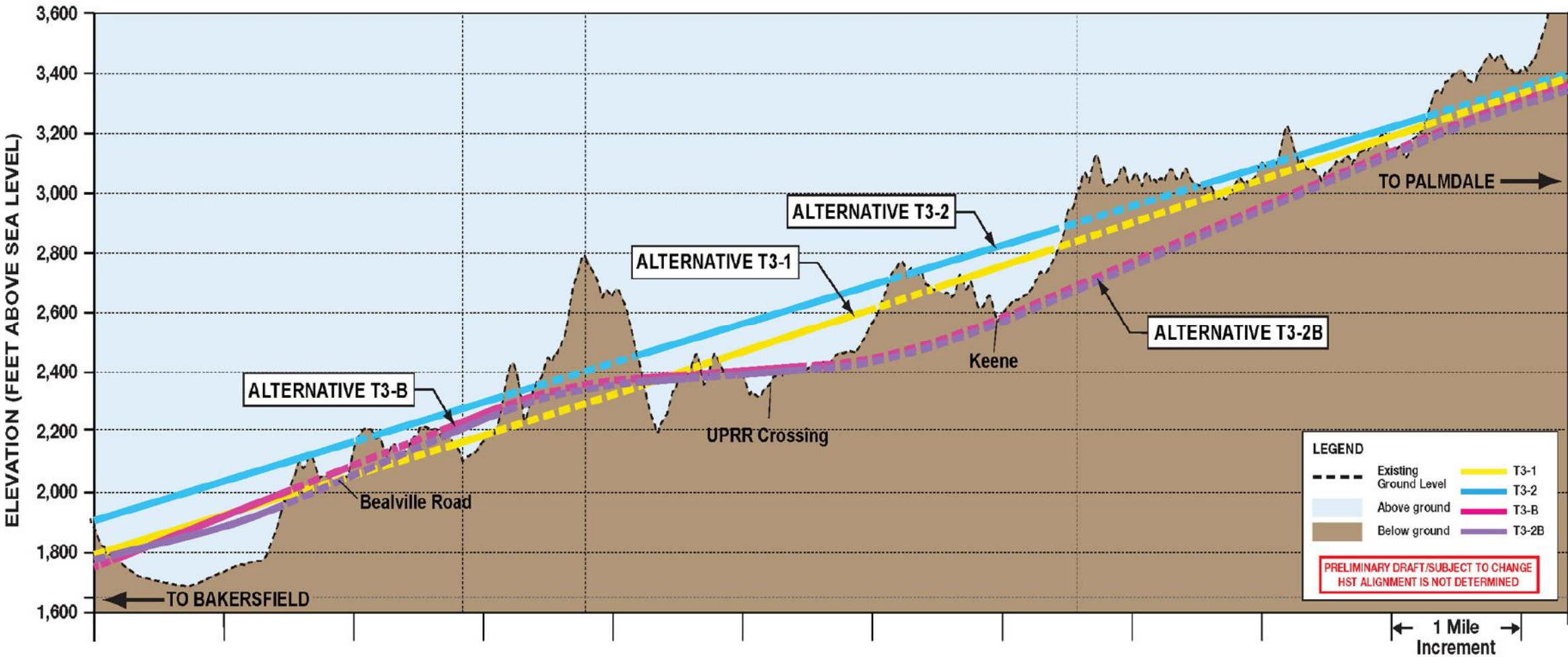




Figure 3-7: Vertical Profiles of Tehachapi Subsection Alternatives





### **Alternative T3-B – Phase Break Alignment**

Alternative T3-B refines Alternative T3-1 by adding a phase break to meet traction power requirements. While Alternative T3-B has a very similar horizontal alignment to Alternative T3-1, it has a different vertical profile, with an average slope of 2.65% and a maximum sustained slope of 3.5% over 3.4 miles.

Alternative T3-B connects with the Edison Subsection just east of Caliente Creek. Between Caliente Creek and Bealeville Road, it has a slope averaging 2.71%, with a sustained slope of 3.5% over 8 miles. Two miles east of Bealeville Road, Alternative T3-B has a 1.3-mile section of flat slope to accommodate traction power facilities (see Figure 3-6). It continues east, passing through a series of tunnels and cuts north of the City of Tehachapi and then travels on elevated structure over the UPRR and SR-58 before entering a 3.5-mile tunnel through the easternmost ridge and exiting the tunnel into the desert west of Mojave. Alternative T3-B follows the same plan and profile as Alternative T3-1 as it curves south across the desert to Purdy Avenue and connects with the Antelope Valley alternatives.

### **Alternative T3-2B – Revised Phase Break Alignment**

Alternative T3-2B refines Alternative T3-2 by including a phase break to meet traction power requirements. It follows a more direct path from Caliente Creek to near the Edison Fault (see Figure 3-6). Along this section, Alternative T3-2B is on a slope of between 2.0% and 2.8%, which differs from the steady 2.5% slope of Alternative T3-2 in this area. East of the Edison Fault, it begins following the Alternative T3-B horizontal alignment. At this point, the vertical alignments differ slightly, but east of Bealeville Road, Alternative T3-2B conforms to both the horizontal and vertical alignment of Alternative T3-B. From this point to the City of Tehachapi, the T3-2B and T3-B alignments are identical. Past Tehachapi, slightly east of Monroe High School, Alternative T3-2B deviates north from the other alignments and takes a straighter alignment through the easternmost tunnel into the desert west of Mojave. The alignment crosses over the UPRR spur serving the cement plant before coming to grade and curving south to meet the Antelope Valley Subsection in the same location as the other Tehachapi alternatives.

### **3.3.3. Antelope Valley Subsection**

The Antelope Valley Subsection alternatives connect with the Tehachapi Subsection west of Mojave near Purdy Avenue, continuing through Rosamond and Lancaster before connecting with the Palmdale to Los Angeles Section at Avenue M, the Lancaster-Palmdale boundary. Mojave and Rosamond are both unincorporated communities in Kern County, while Lancaster and Palmdale are incorporated cities in Los Angeles County.

#### **A. Development of Initial Alternatives**

This section describes the initial alternatives developed with input from the community and a technical working group (TWG) composed of public agency representatives who shared their expertise and local knowledge in developing and refining alternatives. The initial alternatives were all based on the Statewide Program EIR/EIS Preferred Alignment in that they parallel the UPRR railroad in the Antelope Valley between Rosamond and Lancaster. These alternatives, however, reflect greater engineering detail related to rights-of-way, fixed features, and planned development than those considered in the Statewide Program EIR/EIS.

All of the Antelope Valley Subsection alternatives are closely aligned with one another and, therefore, travel through similar topography. However, they differ in the length of alignment that is on elevated structure and the alignment location relative to the UPRR right-of-way and the Sierra Highway. With input from the TWG and other local stakeholders, four initial alternatives were developed for the HST alignment through the Antelope Valley Subsection. These alternatives are described below and shown in Figure 3-8.

- Alternative AV2 is located along the east side of the UPRR ROW through Rosamond and Lancaster.
- Alternative AV3 is located between the UPRR ROW and Sierra Highway (west side of UPRR) and is defined in two variations: AV3A is primarily elevated and AV3B is mixed at-grade/elevated.
- Alternative AV4 is primarily elevated within or along Sierra Highway.
- Alternative AV4 Option, which is the similar to AV4, but avoids the UPRR right-of-way.

## **B. Evaluation and Refinement of the Initial Alternatives**

The initial alternatives were reviewed to determine if they met the project purpose and need, generated substantial impacts on community resources, conflicted with approved future development in the study area, or deviated from desired design performance standards. They were then evaluated against engineering design, constructability, community and natural resource impact criteria as defined in the *Alternatives Analysis Methods for Project EIR/EIS Technical Memorandum Version 2* (October 2009).

Table 3-4 summarizes the alternatives considered in the initial review, highlighting the key aspects and results of the evaluation and indicating which alternatives were carried forward into the full alternatives analysis and which were eliminated from further consideration.

## **C. Alternatives Carried Forward for Detailed Analysis**

Based upon the initial alternatives evaluation results, the Authority and FRA carried forward the following alternatives/options for further study:

- Alternative AV2 – East Side of UPRR
- Alternatives AV3A and AV3B – Between UPRR and Sierra Highway
- Alternative AV4 – Within or Adjacent to Sierra Highway
- AV4 Option – UPRR ROW Avoidance

The alternatives carried forward are the same as those shown in Figure 3-8. They are confined to a fairly narrow corridor adjacent to the UPRR, SR-14, and the Sierra Highway, which is the same corridor as the Program EIR/EIS Preferred Alignment. The difference in the alignments through Lancaster can be discerned in Figure 3-9. Deviations from the Program EIR/EIS Preferred Alignment have chiefly responded to community interest in considering different effects of the alignment placement within a narrow corridor, or for engineering reasons. Local officials representing Lancaster and Rosamond have indicated that all alternatives under consideration are acceptable, with the possible exception of the at-grade variation of Alternative AV3 in Lancaster and the AV4 alignment displacing multiple businesses along Sierra Highway in Rosamond. After discussions with the City of Lancaster, the AV2 alignment was realigned to address their concerns at the Lancaster Business Park. Also, the AV4 alignment was shifted slightly and the Authority committed to designing the locations of the columns for elevated structures to minimize displacement of businesses along the west side of Sierra Highway. Finally, because of uncertainty associated with encroachment of HST facilities on the UPRR ROW, a variant of the AV4 alignment (AV4 Option) was developed through Lancaster that completely avoids UPRR property.



Figure 3-8: Antelope Valley Subsection Initial Alternatives

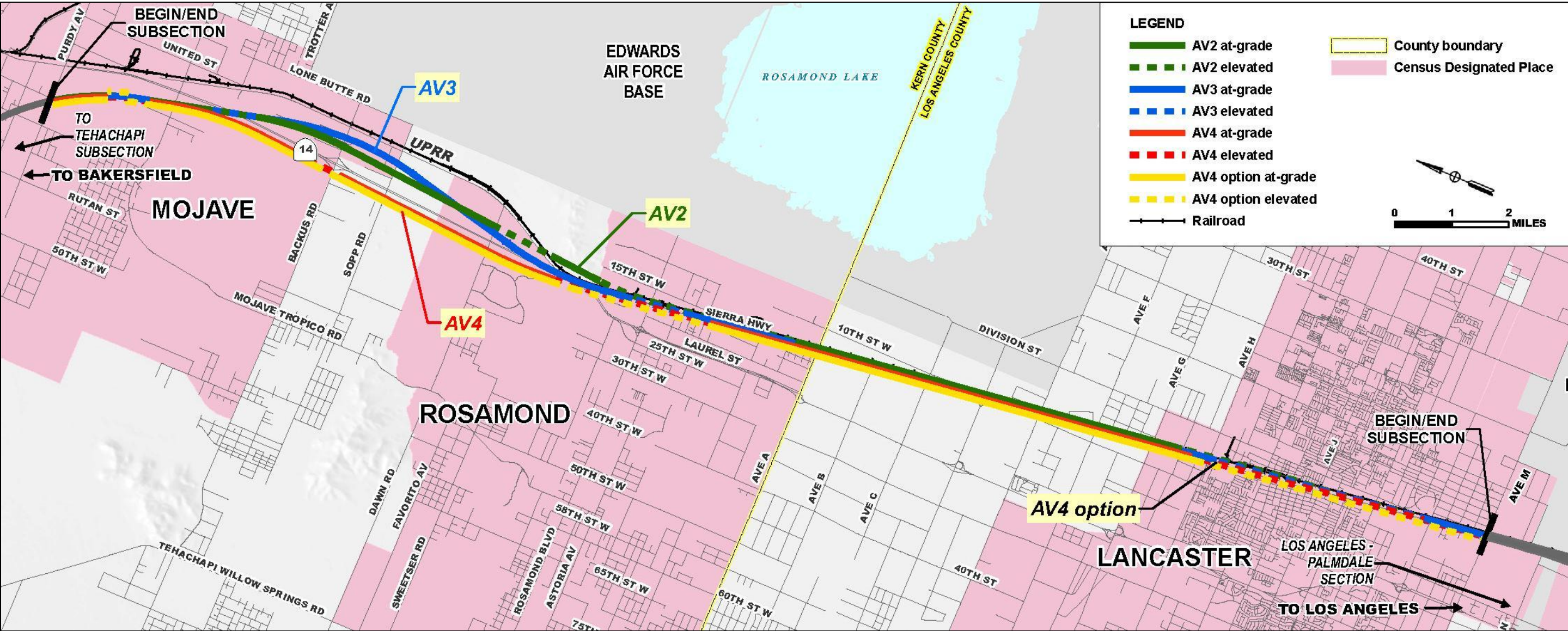




Figure 3-9: Alignment Detail through Lancaster





**Table 3-4: Evaluation Results of Initial Alternatives – Antelope Valley Subsection**

Initial Alternative	Evaluation Comments	Carried forward for Detailed Analysis?
<b>AV2</b> – East Side of UPRR	AV2 minimized land use conflicts because it traversed areas of limited development. The City of Lancaster expressed concern that this HST alignment would impact the Lancaster Business Park. In addition, the alternative required crossings of and encroachments onto UPRR property. Because of the limited number of potential displacements and the possibility of shifting the alignment to avoid the Business Park, this alternative was carried forward for further consideration.	Yes
<b>AV3</b> – Between UPRR and Sierra Highway <ul style="list-style-type: none"> <li><b>AV3A</b> – At-Grade Option</li> <li><b>AV3B</b> – Elevated Option</li> </ul>	The initial evaluation of AV3 indicated neither option produced substantial, unmitigable impacts on the community as long as the City of Lancaster was willing to accept the reconstruction of the current Metrolink station. In addition, the City expressed concerns regarding the number of grade separations that would need to be constructed for AV3A. However, the cost trade-offs for displacing the Metrolink station and for maintaining the HST alignment at grade appeared to justify carrying both options forward.	Yes (both options)
<b>AV4</b> – West side of Sierra Highway	AV4 encroached on the UPRR ROW less than the other alternatives and also followed the public ROW along Sierra Highway. On the other hand, it produced more land use conflicts in Rosamond and Lancaster than the other alternatives and required redesign of the Sierra Highway. A design option, AV4 Option, completely avoids the UPRR ROW and reduces the land use conflicts in Lancaster was developed. Because of the limited encroachment into or avoidance of the UPRR ROW, both AV4 and AV4 option were recommended for further study.	Yes, with new AV4 Option

### **Alternative AV2 – East Side of UPRR**

Alternative AV2 connects to the Tehachapi Subsection alternatives just south of Purdy Avenue in Mojave. Continuing south, it ascends on structure to cross over SR-14 and parallel the highway on the east. North of Rosamond, it crosses over the UPRR on a skewed viaduct and begins to parallel the east side of the UPRR right-of-way on elevated structure through Rosamond.

Crossing into Los Angeles County, Alternative AV2 continues to parallel the UPRR at grade between Avenue A and Avenue G. Approaching Avenue H, it ascends onto elevated structures to traverse central Lancaster. This elevated alignment allows it to pass over three UPRR spurs. Alternative AV2 remains elevated through Lancaster, crossing over every major east-west arterial, including existing overpasses at Avenues H and L. At Avenue J, it crosses over the UPRR ROW on a long, skewed viaduct on the west side of the UPRR and east side of Sierra Highway.

### **Alternative AV3A (All At-Grade) and Alternative AV3B (Partially Elevated)– Between UPRR and Sierra Highway**

Alternative AV3 has two options (AV3A and AV3B) that have identical horizontal alignments, but vary in vertical profile. Alternative AV3A travels primarily at-grade and Alternative AV3B is primarily elevated through Rosamond and Lancaster.

Alternative AV3A connects to the Tehachapi Subsection just south of Purdy Avenue in Mojave. Continuing south, it ascends on structure to cross over SR-14, and parallels the highway on the east. Just north of Rosamond, it begins paralleling the west side of the UPRR right-of-way, either at grade or on structure. The at-grade profile for Alternative AV3A requires arterials crossing Sierra Highway and the UPRR to be grade-separated, particularly designated access roads to Edwards Air Force Base, such as Rosamond Boulevard and Avenue A. In contrast, Alternative AV3B ascends onto an elevated structure at Hillcrest Avenue and descends at Orange Street, crossing over these arterials. From Rosamond to Palmdale, both options are at grade. Entering Lancaster, AV3A remains at grade and AV3B becomes elevated, crossing over every major arterial and the existing overcrossings of the UPRR at Avenues H and L. The at-grade crossing of Lancaster Boulevard is a major concern for the City of Lancaster since a grade separation of Lancaster Boulevard would affect the City's effort to reconstruct and enhance the character of the boulevard. Through Lancaster, both AV3 options hug the UPRR on the west and encroach on UPRR property outside the railroad ROW south of Avenue H. In addition, they require the relocation of the Lancaster Metrolink station to the west along Sierra Highway and the replacement of some of the station parking. South of Avenue J, AV3 displaces an existing bike path along the east side of Sierra Highway. Both options require Avenue M to be grade-separated.

### **Alternative AV4 – West side of Sierra Highway**

Alternative AV4 connects to the Tehachapi Subsection just south of Purdy Avenue in Mojave. Continuing south, it remains to the west of SR-14, primarily on fill or elevated structure to provide grade separation with multiple SR-14 interchanges. North of Rosamond, Alternative AV4 begins paralleling the west side of the UPRR right-of-way, and travels primarily at-grade through Rosamond. Crossing into Los Angeles County, it parallels the UPRR at-grade between Avenue A and Avenue G. Approaching Avenue H, it ascends onto elevated structure to traverse central Lancaster. Alternative AV4 generally mirrors the AV2 profile on the west of UPRR through Lancaster, and is either located east of Sierra Highway or in the Sierra Highway median. At Avenue J, it veers back to run west of the UPRR right-of-way and east of Sierra Highway. Alternative AV4 displaces an existing bike path along the east side of Sierra Highway and requires Avenue M to be grade-separated.

### **Alternative AV4 Option – UPRR ROW Avoidance**

Although Alternative AV4 has fewer encroachments into UPRR property than Alternatives AV2 and AV3, it

was recommended that a localized option that completely avoids UPRR property be examined. Therefore, Alternative AV4 Option is a refinement of Alternative AV4 that only deviates from AV4 in Lancaster where the encroachment onto UPRR property occurs south of Avenue H. Along this segment, AV4 Option continues south on elevated structure, but runs along the west side of Sierra Highway south of Avenue J to avoid the UPRR right-of-way entirely. Unlike Alternative AV4, the option continues elevated on the west side of Sierra Highway avoiding the existing bike path and UPRR property on the east. Although traveling close to existing businesses along Sierra Highway, Alternative AV4 Option would be located away from these businesses by following an undeveloped strip of land that separates the roadway from the businesses. The undeveloped strip would provide sufficient space for the HST elevated structure to avoid displacing any businesses. Like Alternative AV4, this option would require grade separation of Avenue M.

### **3.4. AGENCY COORDINATION AND PUBLIC OUTREACH**

Beginning with Scoping Meetings in September 2009, the refined alternatives were presented for agency, stakeholder, and general public input. Outreach has been conducted to local elected leaders and local stakeholders throughout the Bakersfield to Palmdale Subsection. Separate Technical Working Group (TWG) and Public Information meetings were held in each Edison, Tehachapi, and Lancaster to discuss the alignment design as well as local issues.

#### **3.4.1. Scoping Meetings**

During the scoping period, three public scoping meetings were held between September 15 and 17, 2009, with a total of 189 people attending the three meetings. The Authority and FRA received a total of 50 written comments from individuals and organizations (comment cards, emails, and transcriptions), 15 comments from agencies, and 2 comments from private businesses. Following are summaries of the comments provided in conjunction with the scoping meetings. A summary description of outreach activities by subsection for the Bakersfield to Palmdale section can be found in Appendix D.

A number of commenters noted the benefits of HST, including economic benefits, job creation, and air quality improvements. Primary concerns about the Bakersfield to Palmdale HST alignment included land use conflicts with proposed alignments, including concerns regarding the displacement of residents and devaluation of property. In addition, concerns for potential agricultural impacts, air quality impacts, natural resources impacts, earthquake (seismic concerns), floodplain impacts, noise impacts, recreation impacts, and parking and transit connections at stations were mentioned.

Commenters, including the California Public Utilities Commission, and representatives of BNSF Railway (BNSF) and Union Pacific Railroad (UPRR), expressed concern over potential HST impacts to the safety of highway and rail crossings, and the operation of existing railroad facilities. In particular, UPRR noted a variety of technical issues, including that the UPRR right-of-way varies in width through the Bakersfield to Palmdale corridor and stated their belief that shared use of its right-of-way would not be feasible (UPRR, 2008).

One commenter expressed concern over the potential HST conflict with its proposed development of a solar energy facility in the Tehachapi region and requested its project be considered in the alignment design and evaluation of the HST project.

#### **3.4.2. TWG and PIM Meetings**

For each of the subsections, the Authority held several types of outreach meetings, including Technical Working Group (TWG) meetings and Public Information Meetings (PIMs). The TWGs consisted of senior transportation, planning, and public works staff representing state and local agencies in the HST corridor. The Authority worked with local stakeholders to form TWGs to serve as liaisons to the HST project. In

addition, after the formal environmental scoping period ended, the Authority hosted several PIMs throughout the Bakersfield to Palmdale Section.

The TWG meetings and PIMs are listed in Table 3-5. More detail of comments received at the meetings is provided in Appendix D.

**Table 3-5: Outreach Meetings**

Subsection	Meeting Date	Purpose
Edison	May 26, 2010	Edison Community Public Information Meeting
Edison	May 31, 2010	Technical Working Group in Bakersfield
Tehachapi	December 9, 2009	Technical Working Group in Tehachapi
Tehachapi	June 10, 2010	Tehachapi Area Public Information Meeting
Antelope Valley	December 10, 2009	Technical Working Group in Lancaster
Antelope Valley	June 2, 2010	Lancaster (Antelope Valley) Public Information Meeting

### 3.4.3. Other Stakeholder Outreach

In addition to the outreach efforts described above, the Authority met with local officials in several public meetings, in which Authority representatives provided project updates and responded to questions concerning the project. The Authority has also continued to meet with landowners and other interested parties to discuss their concerns and questions regarding the HST project. A summary of these other stakeholder outreach meetings is provided in Table 3-6:

**Table 3-6: Other Stakeholder Outreach Meetings**

Meeting Date	Meeting
September 3, 2009	Lockheed Martin Aeronautics Corp.
September 3, 2009	Air Force Base, Plant 42
September 3, 2009	Leaders of the Hill
September 8, 2009	Lancaster Mayor and City Manager
September 8, 2009	Lancaster Vice Mayor
September 8, 2009	Lancaster Councilwoman Marquez
September 9, 2009	City of Palmdale Mayor Jim Ledford
September 9, 2009	Lancaster City Councilman Ken Mann
September 9, 2009	Time Warner Cable Television Broadcast
September 10, 2009	Rosamond Municipal Advisory Council
September 11, 2009	Edwards Community Council
September 30, 2009	Quarterly Antelope Valley Transportation Summit
November 3, 2009	Lancaster City Council Decision on HST Station
December 16, 2009	City of Palmdale, Alignment Discussion
February 19, 2010	NASA
February 16, 2010	Antelope Valley Republican Women (AVRW)
February 16, 2010	Sylmar to Palmdale Stakeholder Working Group
February 24, 2010	Rosamond Community Services District
February 24, 2010	City of Lancaster
March 31, 2010	Kern County Planning Staff (Sara Kopp and Chris Mynk)
March 31, 2010	Big L Packers
March 31, 2010	Rick Stevens, Stevens Transportation



Meeting Date	Meeting
April 1, 2010	Kern County Roads and Planning Staff (Warren Maxwell and Cheryl Casdorff)
April 1, 2010	James Daigle, ADS Hancor, Edison Highway
April 1, 2010	George Guimarra Jr., Guimarra Vineyards, Edison Highway
April 14, 2010	Bakersfield Rotary Club
April 15, 2010	Edison Potato Shed Farmers
April 15, 2010	Edison School District Superintendent
April 15, 2010	Bakersfield City Planning Commission
April 15, 2010	Kern County Agriculture and Water Committees
April 16, 2010	San Joaquin Valley Road Commissions
April 29, 2010	Brian Ludicke, Lancaster Planning Director
April 30, 2010	Southern California Edison
April 30, 2010	Antelope Valley Community & Edwards Air Force Base staff
May 18, 2010	ACEC Kern Chapter
May 18, 2010	Quartz Hill Town Council
May 27, 2010	Fire Station 129, Association of Rural Town Councils Presentation
June 1, 2010	University Antelope Valley
June 1, 2010	Hispanic Chamber of Commerce
June 2, 2010	Sempra Energy and Mojave Air and Space Port
August 5, 2010	Pacific Gas & Electric (PG&E)

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## 4.0 EVALUATION OF ALTERNATIVES

This section of the Alternatives Analysis Report focuses on the alternatives carried forward from the evaluation of initial alternatives, as documented in Section 3.0 of this report, as well as several additional alternatives that were identified following the evaluation of initial alternatives.

### 4.1. EDISON SUBSECTION

#### 4.1.1. Alternatives

Four alternatives that travel through the Edison area (E2A, E2B, E3, and E4) were carried forward from the initial review of alternatives (see Section 3.3.1). The alternatives are listed in Table 4-1, and illustrated in Figure 4-1.

**Table 4-1: Edison Alternatives**

<b>Project Alternative/ Option</b>	<b>Description</b>
<b>E2A</b> Partially at grade	Adjacent to SR-58 on North Side
<b>E2B</b> All elevated	Adjacent to SR-58 on North Side
<b>E3</b> All elevated	In SR-58 Median
<b>E4</b> All elevated	Along Edison Highway through Edison

#### 4.1.2. Evaluation

Consistent with the evaluation process outlined in Section 2.0, the alternatives were assessed against the project objectives and evaluation criteria. The resulting findings were then used to decide which alternatives were carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. To facilitate comparison of the alternatives under consideration, the Edison Subsection was divided into three geographic subareas: Oswell Street to Weedpatch Highway; Weedpatch Highway to Malaga Road; and Malaga Road to Caliente Creek (see Figure 4-1). A summary of the evaluation of alternatives by geographic subarea is provided below.

#### 4.1.3. Major Issues in the Evaluation of Alternatives

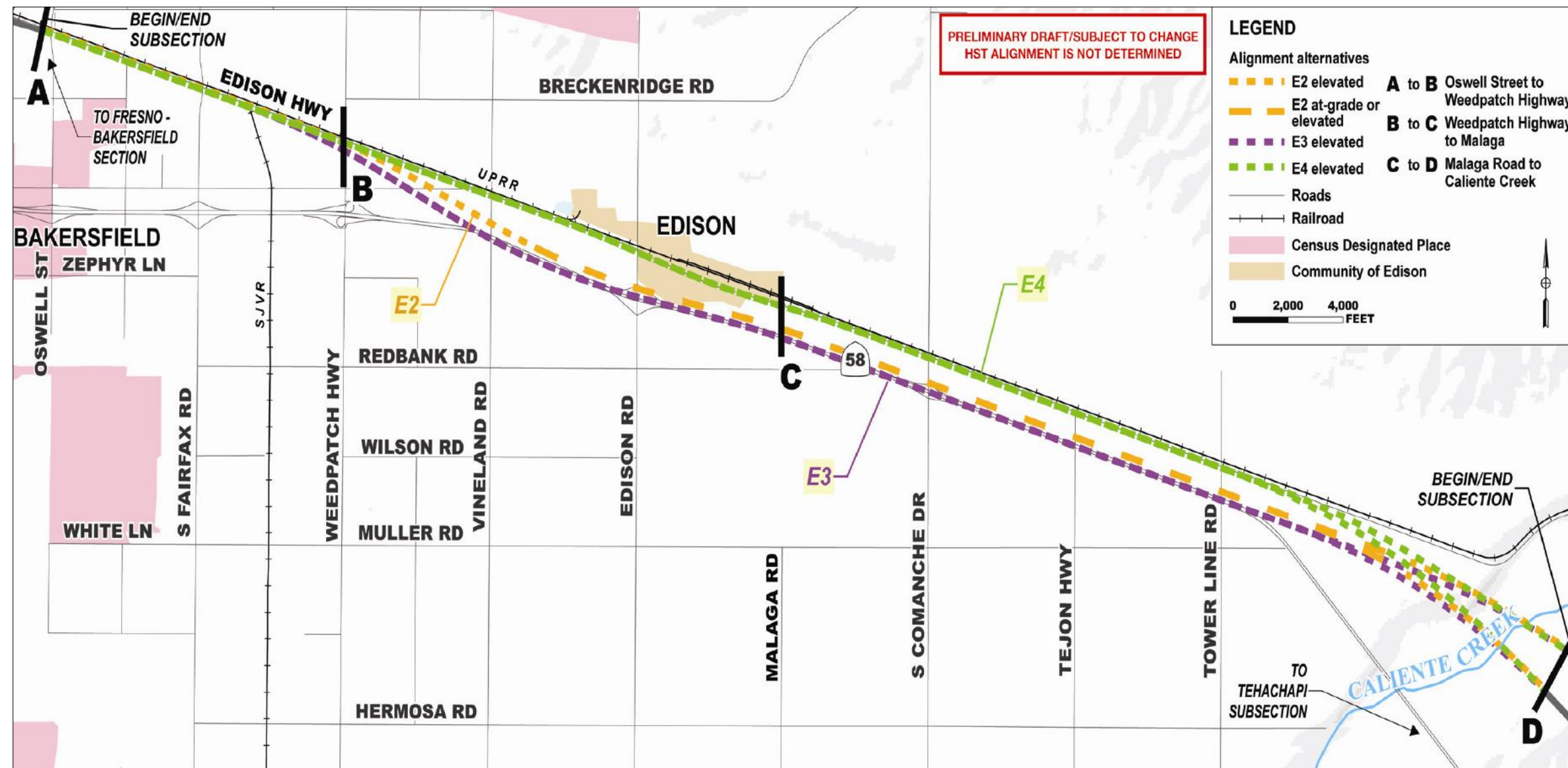
The major issues in this subsection that influenced the evaluation of alternatives are listed below and are further described by geographic area in Section 4.1.4.

- Agricultural land displacement
- Business operation and circulation along Edison Highway
- SR-58 facilities
- Community of Edison civic facilities

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### Figure 4-1: Edison Subsection



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#### **4.1.4. Comparison of Alternatives by Geographic Subarea**

##### **Edison Subarea A-B: Oswell Street to Weedpatch Highway**

##### **Alternatives E2, E3, E4: South Side of Edison Highway**

All alternatives travel the same alignment paralleling Edison Highway on the south between Oswell Street and Weedpatch Highway (see Figure 4-2). The elevated alignment passes above existing overcrossings of Edison Highway and the UPRR and over a spur track. Columns for the structure would be placed in private property bordering Edison Highway, potentially displacing businesses serving East Bakersfield, a low-income community. The Authority is working with representatives of Kern County to determine whether sufficient highway right-of-way exists to accommodate HST within the public right-of-way to avoid disrupting or displacing these businesses. Placement of columns is also critical to continued circulation of trucks accessing packing and distribution facilities along Edison Highway. Entryways to these commercial enterprises, such as Bolthouse Farms (indicated in Figure 4-3), are typically 50-60 feet wide. Column placement must allow truck access and not restrict the line of sight of truck drivers.

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Figure 4-2: Oswell Street



Figure 4-3: Fairfax Road



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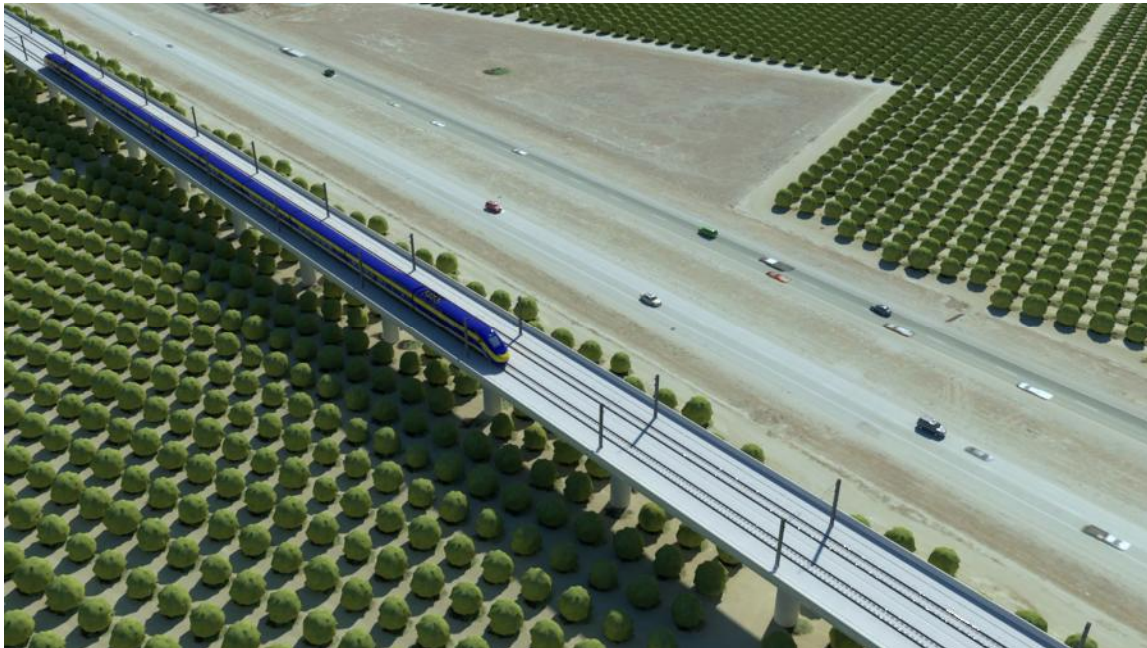
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**Edison Subarea B-C: Weedpatch Highway to Malaga Road****Alternative E2: North Side of SR-58**

East of Weedpatch Highway, Alternative E2, either elevated or at grade, would curve south toward the intersection of SR-58 and Vineland Road, but would remain north of SR-58 traversing the northern portion of the SR-58/Edison Road interchange and the Malaga Road overpass. In some stretches of the corridor, it would travel through orange orchards, vineyards, and potato fields. The at-grade option (E2A) would require partial reconstruction of SR-58 interchange facilities and would sever agricultural parcels, permanently displacing rows of crops. In contrast, the elevated option (E2B) may allow replanting crops displaced during construction and re-establishing farm operation under the elevated structure (as depicted in Figure 4-4). In addition, E2B would pass over many of the SR-58 ramps that would be affected by at-grade construction under E2A. The cost advantage for constructing at-grade would be reduced by the more extensive interchange reconstruction requirements of E2A.

**Figure 4-4: E2B Simulation along SR-58**

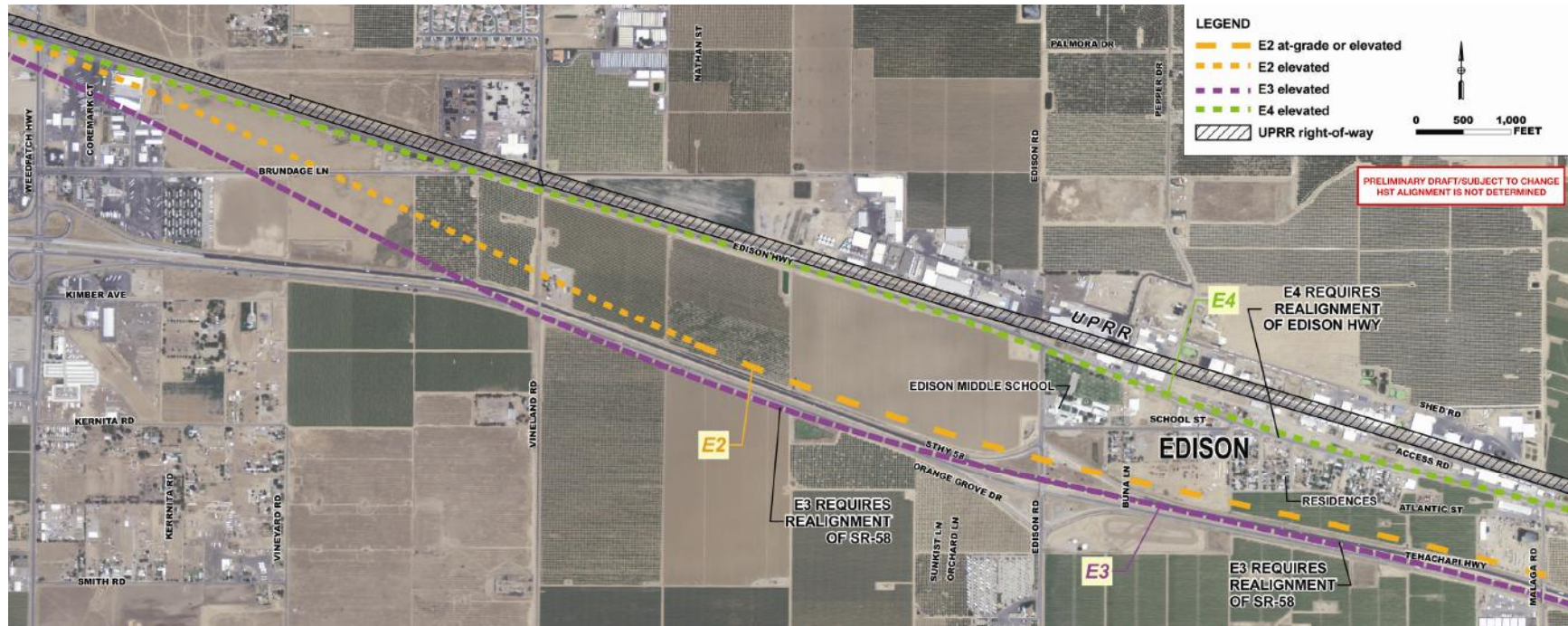
**Alternative E3: Within SR-58 Median**

Alternative E3 would displace some agricultural land west of Vineland Road, but upon entering the median of SR-58 at Vineland Road, the impacts would be isolated to Caltrans facilities (see Figure 4-5). The HST engineering design standards for maintaining 220 mph operation, would require construction of straddle bents to stay within the gradually curving right-of-way of SR-58. The placement of the straddle bents could preclude future widening of the highway, would require concrete barriers to protect the columns, and would require maintenance of line of sight for drivers in accordance with Caltrans requirements. Alternatively, SR-58 could be realigned to follow the path of the elevated HST structure, at the very least requiring realignment of the eastbound traffic lanes and reconstruction of portions of each SR-58 interchange between Vineland Road and Tower Line Road, a distance of two miles. In either case, Alternative E3 would be costly to construct and require coordination with Caltrans during design, construction and maintenance.

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Figure 4-5: Community of Edison



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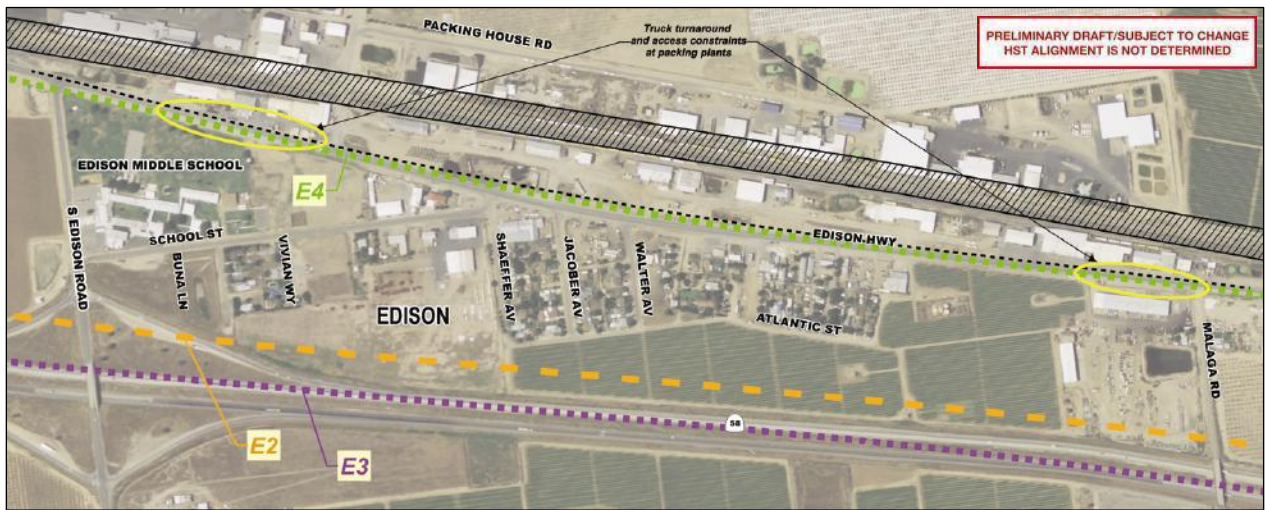


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### Alternative E4: South Side of Edison Highway through Community of Edison

Alternative E4 would continue east of Weedpatch Highway, along the south side of Edison Highway on elevated structure, through the community of Edison, which is a low-income community. A strip of undeveloped land along the south side of Edison Highway could be used for column placement, avoiding adjacent agricultural fields. In Edison, the alignment would follow the northern perimeter of Edison Middle School (see Figure 4-6). East of the school, Edison Highway would be realigned so that the elevated structure would not have to cross the highway twice. The columns would be placed to avoid nearby residences, the local firehouse, and agricultural packing and distribution facilities. However, the columns may impose a visual and circulation hazard for trucks accessing the agricultural processing facilities that border Edison Highway in Edison (see Figure 4-7). Edison Highway will likely need to be redesigned to minimize these hazards.

**Figure 4-6: Alignment Detail through Edison**



**Figure 4-7: Simulation at Agricultural Packing/Shipping Facilities in Edison**



## **Edison Subarea C-D: Malaga Road to Caliente Creek**

### **Alternative E2: North Side of SR-58**

East of Malaga Road, Alternative E2 would continue at grade or elevated along the north side of SR-58. The at-grade alignment option (E2A) would require partial reconstruction of Comanche Road Interchange, (see Figure 4-8 and Figure 4-9) Tejon Highway overpass, and Tower Line Road interchange. Reconstruction may include realigning existing interchange ramps, rebuilding overcrossings, and raising local road profiles to provide the necessary clearance over HST. E2A would also continue to displace or sever agricultural land in this area. The reconstruction of SR-58 facilities and the permanent displacement of cropland would not occur under the elevated alignment option (E2B).

### **Alternative E3: Within SR-58 Median**

Alternative E3 would continue on elevated structure within the SR-58 median avoiding agricultural parcels, but would require additional height to provide necessary clearance over existing overpasses.

### **Alternative E4: South Side of Edison Highway to SR-58**

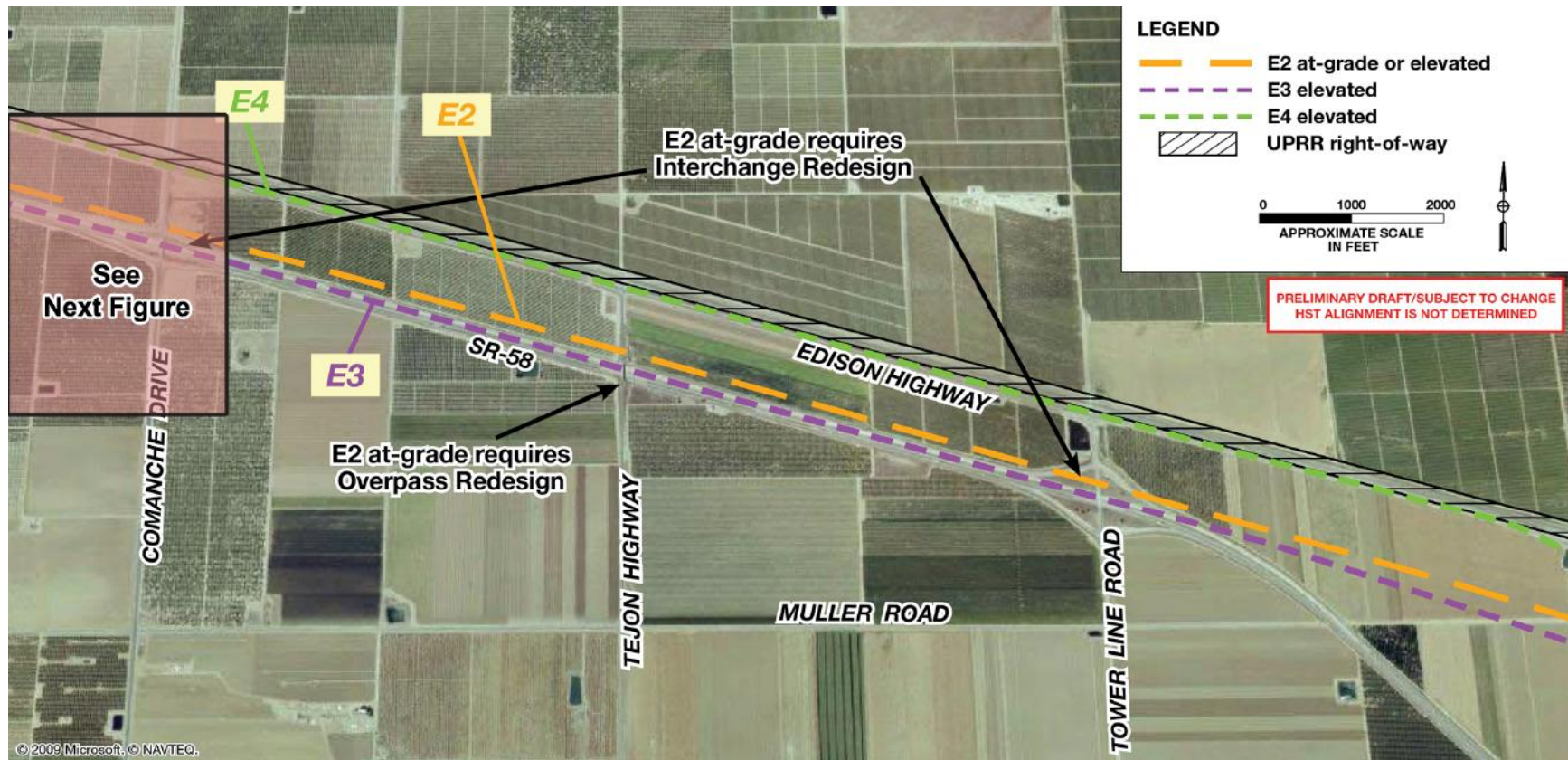
Alternative E4 would remain on elevated structure along the southern edge of Edison Highway with columns located within a strip of undeveloped land to avoid displacement of agricultural uses.

#### **4.1.5. Recommendations for Edison Subsection**

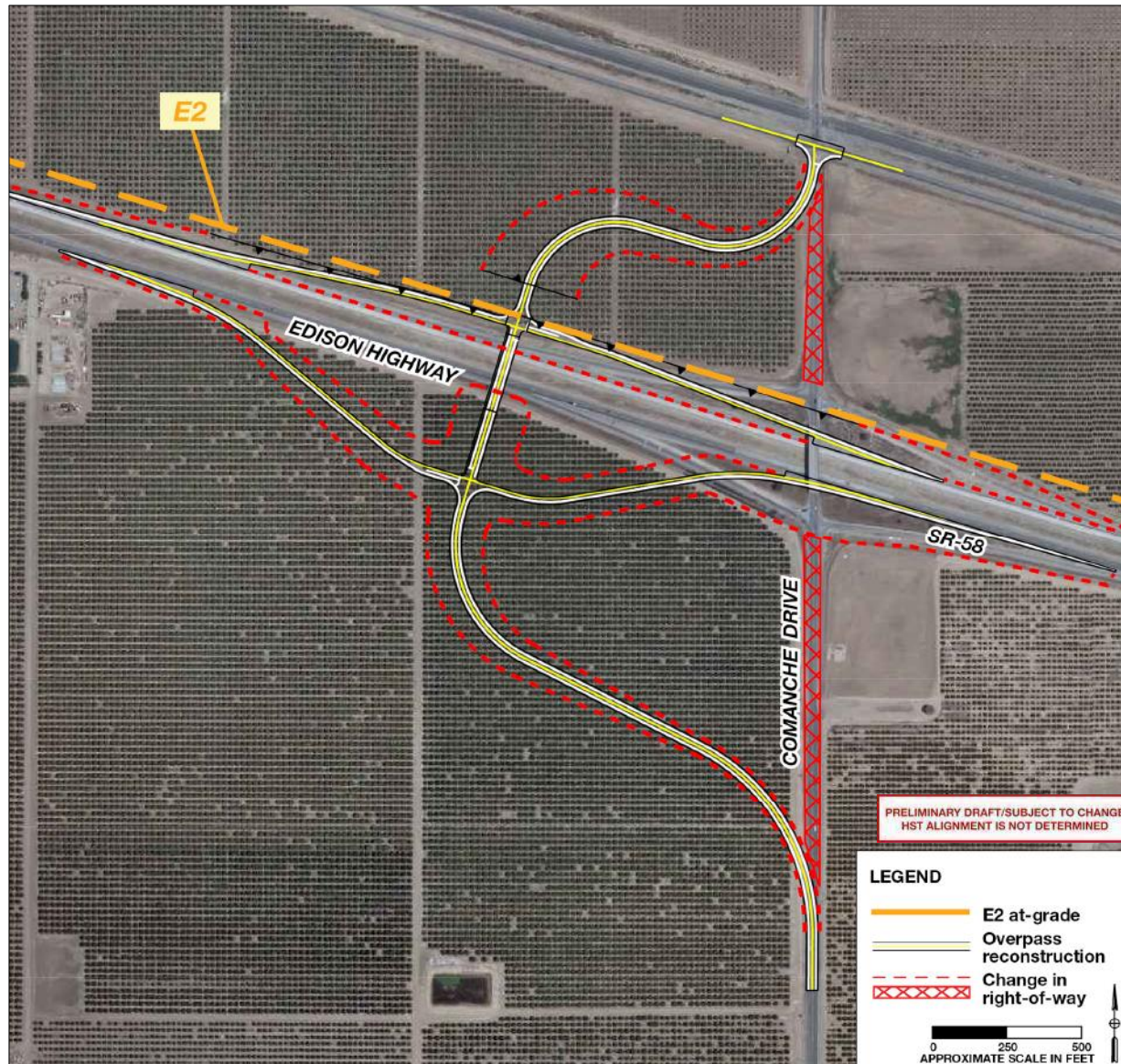
Table 4-2 summarizes the evaluation of alternatives for the Edison subsection and recommends whether or not the alternatives should be carried forward for further analysis in the EIR/EIS. The alternatives recommended to be carried forward are shown in Figure 4-10. A more detailed account of the findings is presented in Table 4-3.



Figure 4-8: SR-58 Interchanges East of Edison



**Figure 4-9: SR-58 Reconstruction at Comanche Road for E2 at-grade**





**Table 4-2: Alternatives Evaluation Analysis – Edison Subsection**

<b>Project Alternative/ Option</b>	<b>Findings</b>	<b>Recommendation</b>
<b>E2A</b> – SR-58-Adjacent North Side (Partially At-Grade Option)	<ul style="list-style-type: none"> <li>Requires reconstruction of five overpasses along SR 58.</li> <li>Least amount of structures, but lower construction costs resulting from at-grade construction would be substantially increased by reconstruction of multiple SR-58 interchanges</li> <li>157 acres of agricultural land would be permanently displaced, more than E3 and E4</li> </ul>	<b>Carry Forward</b>
<b>E2B</b> – SR-58-Adjacent North Side (All Elevated Option)	<ul style="list-style-type: none"> <li>Preferred over E2A by agricultural business stakeholders.</li> <li>Less acreage of displaced cropland than E2A.</li> <li>Possibility of replanting under elevated structures, resuming agricultural operation after construction is completed.</li> <li>Requires limited reconstruction of SR-58 ramps</li> </ul>	<b>Carry Forward</b>
<b>E3</b> – In SR-58 Median	<ul style="list-style-type: none"> <li>Would require a 2-mile realignment of SR-58 and reconstruction of multiple overpasses or use of massive straddle bents spanning the freeway</li> <li>Realignment and reconstruction of SR-58 would displace 81 acres of farmland</li> <li>Highest capital cost and greatest length of elevated alignment</li> <li>Construction and maintenance of HST structures within the SR-58 right-of-way would require temporary closure of freeway lanes</li> <li>Least impact on the community of Edison</li> <li>Use of SR-58 median may reduce right-of-way acquisition</li> <li>Favored by local stakeholders</li> </ul>	<b>Not Carry Forward</b>
<b>E4</b> – Along Edison Highway	<ul style="list-style-type: none"> <li>Least amount of agricultural land affected</li> <li>Requires less roadway reconstruction than E2 and E3 Alternatives</li> <li>Would affect the most residential parcels</li> <li>Offers opportunity to place HST columns in county right-of-way or undeveloped strip of land adjacent to Edison Highway</li> <li>HST alignment passes near but does not displace school facilities or residences in community of Edison</li> <li>May impede access to packing and shipping plants along Edison Highway</li> <li>Requires minor realignment of Edison Highway and redesign to improve vehicle circulation through the community of Edison</li> </ul>	<b>Carry Forward</b>

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Figure 4-10: Edison Alternatives Carried Forward

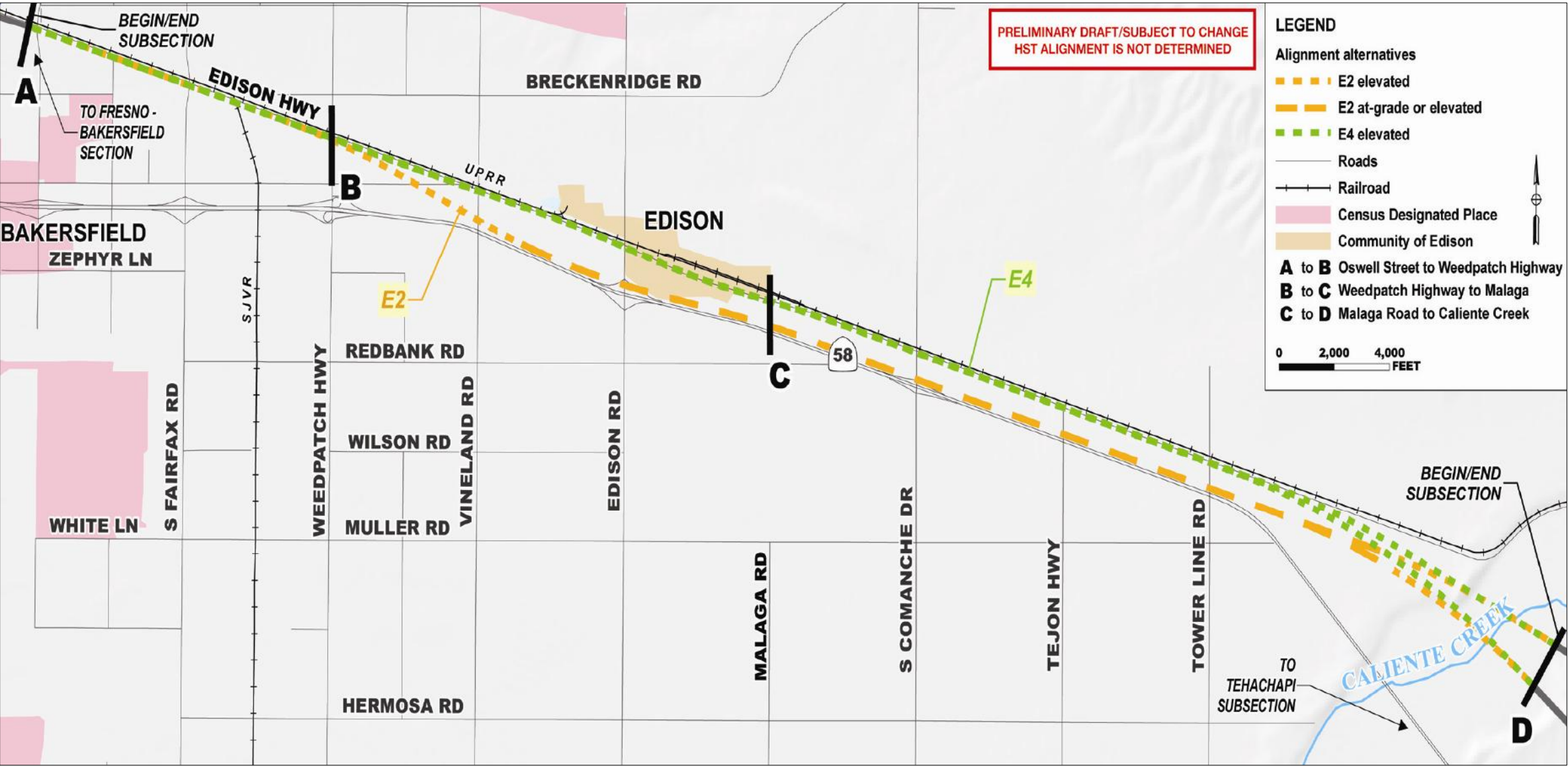


Table 4-3: Edison Subsection Evaluation Summary

Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

Category	Measurement	E2 SR-58 Adjacent North Side		E3 In SR-58 Median	E4 Along Edison Highway
		Partially At-Grade (E2A)	All Elevated (E2B)	All Elevated	All Elevated
Disruption to Communities	Displacements	Alignment crosses: <ul style="list-style-type: none"><li>• 31 agricultural parcels (157 acres)</li><li>• 15 residential parcels (5 acres)</li><li>• 27 commercial parcels (10 acres)</li><li>• 45 industrial parcels (47 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>• 31 agricultural parcels (157 acres)</li><li>• 15 residential parcels (5 acres)</li><li>• 27 commercial parcels (10 acres)</li><li>• 45 industrial parcels (47 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>• 22 agricultural parcels (81 acres)</li><li>• 14 residential parcels (4 acres)</li><li>• 28 commercial parcels (11 acres)</li><li>• 48 industrial parcels (32 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>• 22 agricultural parcels (80 acres)</li><li>• 20 residential parcels (5 acres)</li><li>• 41 commercial parcels (12 acres)</li><li>• 50 industrial parcels (38 acres)</li></ul>
	Properties with access affected	Where E2A is at-grade between Vineland Road and Tower Line Road, it has been aligned as close as possible and parallel to SR-58 to minimize impacts on land parcels. This would require partial right-of-way take of lands between the HST alignment and SR-58, but would not sever or impact existing access to the remainder of the parcels, which retain access from north-south arterials and local roads.	Since this entire E2B alternative is on elevated guideway, consideration would be given to column placement to minimize impacts to property access and land use under the elevated guideway.	Since the alignment is within the Caltrans right-of-way, E3 would not affect property access and constitutes the least access issues for all alternatives.	For E4, since this entire alignment alternative is on elevated guideway, consideration would be given to column placement to minimize impacts to property access and land use under the elevated guideway.
	Local traffic effects around stations	Not applicable. No station location.			
	Local traffic effects at grade separations	For E2A, new grade separations are proposed at Edison Road, Malaga Road, Comanche Drive, Tejon Highway, and Tower Line Road.	E2B has low impacts to local traffic. No new local road grade separations are anticipated.  Close coordination would be required with Caltrans to ensure LOS is not affected during construction.	E3 has low impacts to local traffic. No new local road grade separations are anticipated.  Close coordination would be required with Caltrans to ensure LOS is not affected during construction.	E4 has low impacts to local traffic. No new local road grade separations are anticipated.  Close coordination would be required with Caltrans to ensure LOS is not affected during construction.
Design Objectives	Travel time (220 mph)	3 minutes - 3 seconds Travel time assumes a through ("express") train at 220mph. Travel time including a station stop would depend on acceleration and deceleration of the train plus station stop time.			
	Route length	Total Length: 11.2 miles  Elevated: 5.5 miles Tunnel: 0 miles	Total Length: 11.2 miles  Elevated: 11.2 miles Tunnel: 0 miles		
	Intermodal connections	Not applicable. No station location.			

Category	Measurement	E2 SR-58 Adjacent North Side		E3 In SR-58 Median	E4 Along Edison Highway
		Partially At-Grade (E2A)	All Elevated (E2B)	All Elevated	All Elevated
	Capital costs	E2A has the least elevated structure of all alternatives and therefore, the least capital cost of the E alternatives. E2A would require reconstruction of SR-58 interchange, but not roadway realignment.	E2B has a higher capital cost than E2A. E2B has the greatest length of elevated structure (along with E3 and E4) and requires the reconfiguration of SR-58 ramps.	E3 has the highest capital costs of all E alternatives. E3 has the greatest length of elevated structure (along with E2B and E4) and would require the realignment of SR-58 and reconstruction of interchanges.  To meet HST train design criteria and remain within the SR-58 median, a segment of SR-58 (between Vineland Road and Malaga Road) would need to be realigned to match the HST alignment. If the existing SR-58 is to remain, extensive straddle bents would need to be used to clear SR-58 traveled lanes. Therefore, the added cost of realigning/straddling the state highway as well the HST being elevated for 11+ miles entails the greatest capital cost of all E alternatives.	E4 has similar capital cost to E2B. E4 has the greatest length of elevated structure (along with E2B and E4) and may require a realignment of a portion of Edison Highway near the community of Edison where the HST alignment crosses.
	Operating costs	Operating costs across all options will be very similar. There are no significant differing features of any of the alignments that would cause operating costs to vary.			
	Maintenance costs	For E2A, the length of elevated guideway is reduced significantly over the other E alternatives), thereby lessening long term maintenance costs.	E2B, E3 and E4 have higher maintenance costs than E2A due to longer length of elevated structure.		
Land Use	Potential for Transit Oriented Development	Not applicable. No station location.			
	Consistency with other planning efforts	Generally consistent with other planning efforts. Generally avoids developed land uses in the community of Edison. Would displace some businesses along Edison highway.		Generally consistent with other planning efforts. Would require the realignment of SR-58, a Caltrans operated highway. Would displace some businesses along Edison Highway.	Generally consistent with other planning efforts. Goes through community of Edison but avoids displacing residential or public facilities. However, would avoid displacement of businesses along Edison Highway.
Constructability	Constructability	For E2A, the at-grade alignment would require substantial reconstruction at SR-58 and Edison Road, Malaga Road, Comanche Drive, Tejon Highway, and Tower Line Road due to the close proximity of the HST alignment to interchange ramps. This reconstruction may include realigning existing interchange ramps, reconstructing overcrossing structures, and raising local road profiles to provide the necessary clearance over HST.  Close coordination would be required with Caltrans to ensure LOS is not affected during construction and to ensure location would not preclude any future improvements of these interchanges.	For E2B, structural supports are located within Caltrans right-of-way at the SR-58/Edison/Comanche Dr/Tower Line Road interchanges.  Close coordination would be required with Caltrans to ensure LOS is not affected during construction and to ensure location would not preclude any future improvements of these interchanges.	For E3, the segment between Malaga Road to Vineland Road would need to be realigned (approximately 2 miles) to match the HST alignment geometry. The realignment of SR-58 would require the reconstruction of the interchange at Edison Road and the overcrossing structure at Vineland Road. Highway realignment would require extensive construction staging to maintain acceptable levels of service for traffic during construction, including extensive coordination/approvals from Caltrans.	For E4, this alternative is within the general proximity of Edison Highway. Existing local roads provide access for most of the construction.  E4 crosses over Edison Highway near the community of Edison. The may require a realignment of a segment of Edison Highway and/or straddle bent construction for HST elevated structure to avoid local road conflicts with the proposed HST alignment.
	Disruption to existing railroads	Construction of grade separation over spur crossing between Fairfax Road and Weedpatch Highway to be done such as to minimize disruptions during construction.			
	Disruption to and relocation of utilities	Alignment crosses 16 utilities: <ul style="list-style-type: none"><li>7 natural gas lines</li><li>9 electric transmission lines</li></ul>	Alignment crosses 16 utilities: <ul style="list-style-type: none"><li>7 natural gas lines</li><li>9 electric transmission lines</li></ul>	Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>4 natural gas lines</li><li>9 electric transmission lines</li></ul>	Alignment crosses 15 utilities: <ul style="list-style-type: none"><li>6 natural gas lines</li><li>9 electric transmission lines</li></ul>

Category	Measurement	E2 SR-58 Adjacent North Side		E3 In SR-58 Median	E4 Along Edison Highway
		Partially At-Grade (E2A)	All Elevated (E2B)	All Elevated	All Elevated
Environmental Resources	Waterways/Sensitive Habitat Areas	Alignment crosses Caliente Creek. Crosses 2 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater ponds</li><li>Riverine</li></ul> No crossing of designated critical habitat. Crosses 81 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>Bakersfield cactus</li><li>California jewel-flower</li><li>San Joaquin woollythreads</li></ul>	Alignment crosses Caliente Creek. Crosses 2 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater ponds</li><li>Riverine</li></ul> No crossing of designated critical habitat. Crosses 81 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>Bakersfield cactus</li><li>California jewel-flower</li><li>San Joaquin woollythreads</li></ul>	Alignment has 2 waterways crossings, including: <ul style="list-style-type: none"><li>Caliente Creek</li><li>Unnamed waterway</li></ul> Crosses 2 acres of wetland habitat, including: Freshwater ponds <ul style="list-style-type: none"><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 86 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>Bakersfield cactus</li><li>California jewel-flower</li><li>San Joaquin woollythreads</li></ul>	Alignment crosses Caliente Creek. Crosses 3 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater ponds</li><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 72 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>Bakersfield cactus</li><li>California jewel-flower</li><li>San Joaquin woollythreads</li></ul>
	Cultural Resources	No impact on National Register of Historic Places listed structures or CHRIS listed sites.	No impact on National Register of Historic Places listed structures or CHRIS listed sites.	No impact on National Register of Historic Places listed structures or CHRIS listed sites.	No impact on National Register of Historic Places listed structures or CHRIS listed sites.
	Parklands	No direct or indirect impacts to parks.			
	Agricultural lands	Traverses 161 acres of important farmland; 122 acres classified as prime.	Traverses 161 acres of important farmland; 122 acres classified as prime.	Traverses 148 acres of important farmland; 111 acres classified as prime.	Traverses 145 acres of important farmland; 131 acres classified as prime.
	Noise and vibration	1,525 sensitive noise receptors: <ul style="list-style-type: none"><li>1,522 residential parcels</li><li>2 churches</li><li>1 school</li></ul> 98 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>98 residential parcels</li></ul>	1,525 sensitive noise receptors: <ul style="list-style-type: none"><li>1,522 residential parcels</li><li>2 churches</li><li>1 school</li></ul> 98 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>98 residential parcels</li></ul>	1,527 sensitive noise receptors: <ul style="list-style-type: none"><li>1,524 residential parcels</li><li>2 churches</li><li>1 school</li></ul> 76 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>76 residential parcels</li></ul>	1,549 sensitive noise receptors: <ul style="list-style-type: none"><li>1,546 residential parcels</li><li>2 churches</li><li>1 school</li></ul> 134 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>134 residential parcels</li></ul>
	Visual/scenic resources	838 residential parcels within quarter-mile of elevated structures.	838 residential parcels within quarter-mile of elevated structures.	837 residential parcels within quarter-mile of elevated structures.	881 residential parcels within quarter-mile of elevated structures.
	Geotechnical constraints	Crosses 1 unnamed fault.  No highly erodible soils or identified landslide locations.			
	Hazardous materials	5 hazardous materials sites.	5 hazardous materials sites.	4 hazardous materials sites.	13 hazardous materials sites.

Note: **Dark gray** shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. **Gray shading** in the table body indicates the reason for that recommendation.



## 4.2. TEHACHAPI SUBSECTION

### 4.2.1. Alternatives

Four initial alternatives (T3-1, T3-2, T3-B, T3-2B), two incorporating phase breaks and two without, were carried forward into this analysis. The alternatives are listed in Table 4-4 and illustrated in Figure 4-11.

**Table 4-4: Tehachapi Alternatives**

<b>Project Alternative/ Option</b>	<b>Description</b>
<b>T3-1</b> Quantm-Generated Alignment	2.65% Average Slope 2.75% Maximum Sustained Slope over 12 miles
<b>T3-2</b> Modified Quantm-Generated Alignment	2.5% Average Slope 2.5% Maximum Sustained Slope over 20 miles
<b>T3-B</b> Phase Break Alignment	2.65% Average Slope 3.5% Maximum Sustained Slope over 3.4 miles
<b>T3-2B</b> Revised Phase Break Alignment	2.5% Average Slope 3.5% Maximum Sustained Slope over 3.4 miles

### 4.2.2. Evaluation

Consistent with the evaluation process outlined in Section 2.0, the alternatives were assessed against the project objectives and evaluation criteria. The resulting findings were then used to decide which alternatives were carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. To facilitate comparison of the alternatives under consideration, the Tehachapi Subsection was divided into three geographic subareas: Caliente Creek to Golden Hills (A-B); Golden Hills to Cameron Road (B-C); and Cameron Road to Purdy Avenue (C-D) (see Figure 4-11). A summary of the evaluation of alternatives by geographic subarea is provided below.

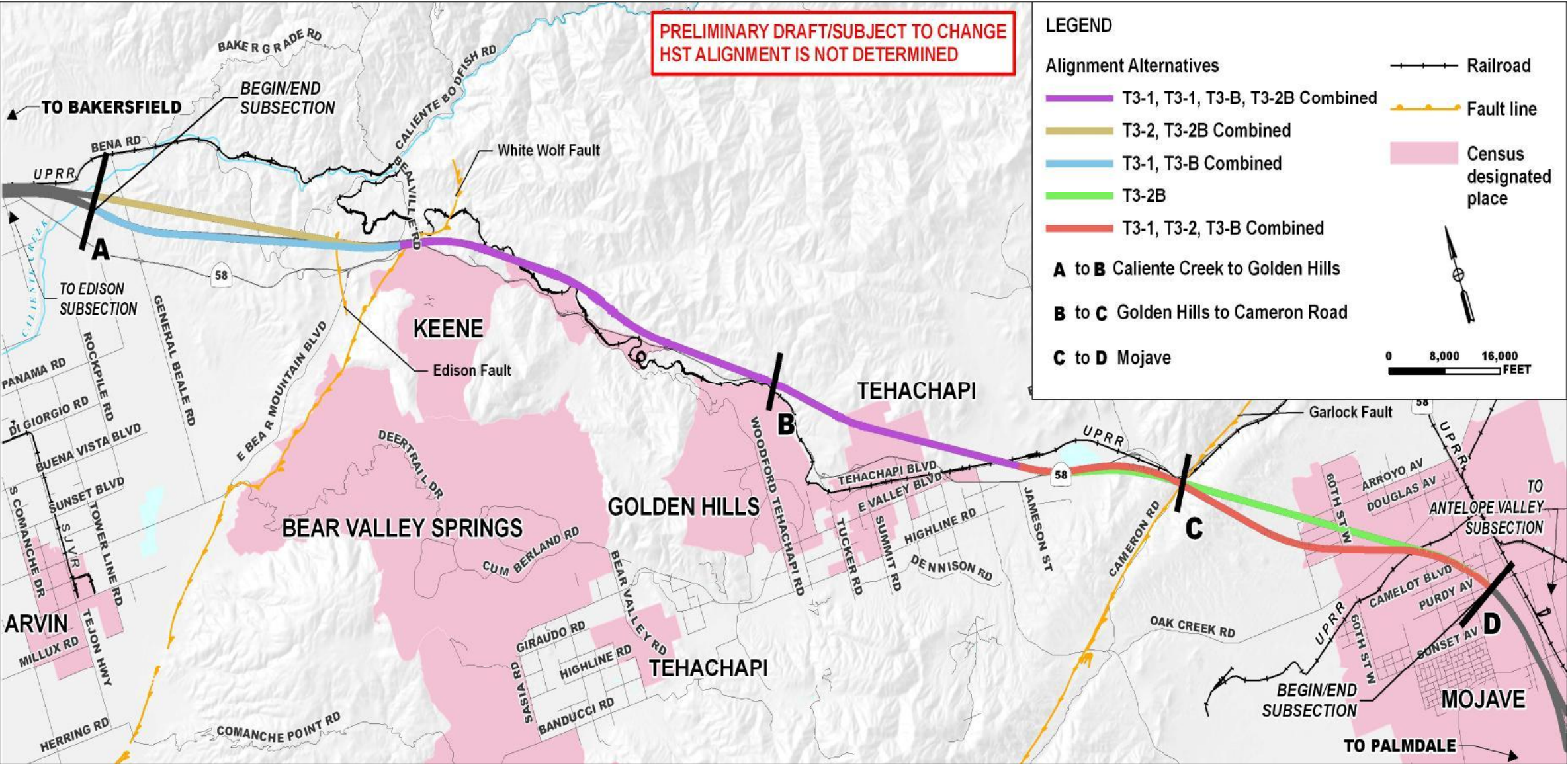
### 4.2.3. Major Issues in the Evaluation of Alternatives

Although the alignments for the alternatives are similar, their profiles vary, generating different construction and operating issues and environmental impacts. The major issues in this subsection that influenced the evaluation of alternatives are listed below and are further described by geographic area in Section 4.2.4

- Construction cost related to tunneling and constructing viaduct
- Average and sustained slopes
- Natural resources affected
- Seismic faults

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Figure 4-11: Tehachapi Overview



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#### **4.2.4. Comparison of Alternative by Geographic Subarea**

##### **Tehachapi Subarea A-B: Caliente Creek to City of Tehachapi**

###### **Alternatives T3-1 and T3-2**

The Alternative T3-1 and T3-2 alignments have lower sustained slopes from Caliente Creek to Tehachapi than the Phase Break alternatives. In addition, these alignments have longer elevated sections and shorter tunnel sections than T3-B and T3-2B. This results in lower capital costs for T3-1, and somewhat higher capital costs for T3-2 because T3-2 is constructed at a higher elevation and on higher viaducts.

###### **Alternatives T3-B and T3-2B (Phase Break Alternatives)**

Alternatives T3-B and T3-2B include a relatively flat section on the ascent through the western incline section of the Tehachapi Mountains to accommodate traction power requirements (see Figure 3-7). By flattening the slope for approximately one mile, T3-B and T3-2B require higher maximum slopes than T3-1 and T3-2, producing significantly more tunneling and increasing capital costs relative to T3-1 and T3-2.

##### **Tehachapi Subarea B-C: City of Tehachapi to Cameron Road**

###### **Alternatives T3-1, T3-2, T3-B, and T3-2B**

As shown in Figure 4-12, all alternatives generally follow the same horizontal and vertical alignments through this area, with all traversing areas planned for development and passing close to Monroe High School and a planned hospital. They also pass along the southern edge of the Proctor Lake wetland, with T3-2B aligned slightly to the south of the other alternatives, thus affecting slightly less acreage of wetland than other alternatives.

##### **Tehachapi Subarea C-D: Mojave (Cameron Road to Purdy Avenue)**

###### **Alternatives T3-1, T3-2, and T3-B**

Alternatives T3-1, T3-2, and T3-B share the same horizontal and vertical alignments from Cameron Road to Purdy Avenue (see Figure 4-13). All three would cross the Garlock Fault at grade and would require a long tunnel section (3.5 miles) and a short elevated section.

###### **Alternative T3-2B**

This Phase Break alternative follows a straighter alignment than Alternatives T3-1, T3-2, and T3-B through the easternmost ridge of the Tehachapi Mountains on its descent towards Mojave. The more direct alignment produces a different vertical profile that requires a longer elevated section east of the tunnel.

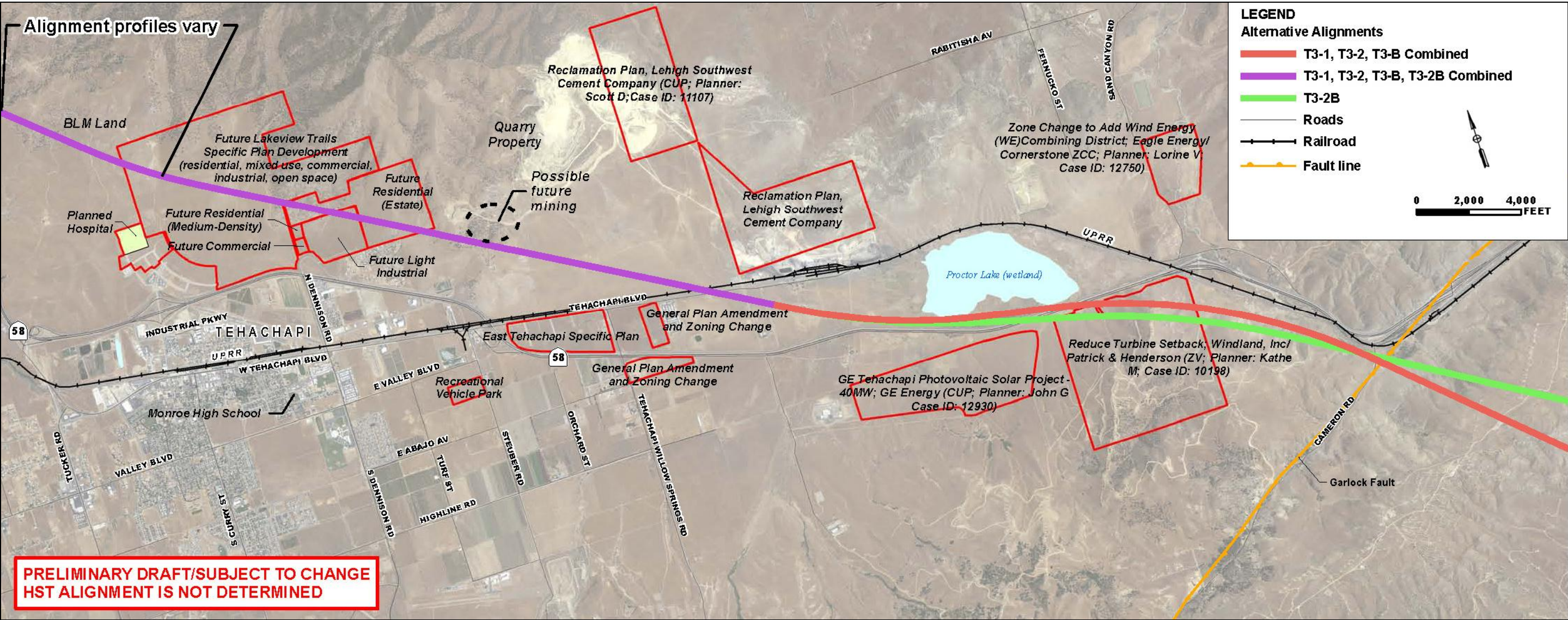
#### **4.2.5. Recommendations for Tehachapi Subsection**

Table 4-5 summarizes the evaluation of alternatives for the Tehachapi subsection and the recommendation whether the alternative or option have merit for being carried forward for further analysis in the EIR/EIS. The alternatives recommended to be carried forward are indicated in Figure 4-14. A more detailed account of the findings is presented in Table 4-6.

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Figure 4-12: City of Tehachapi to Cameron Road



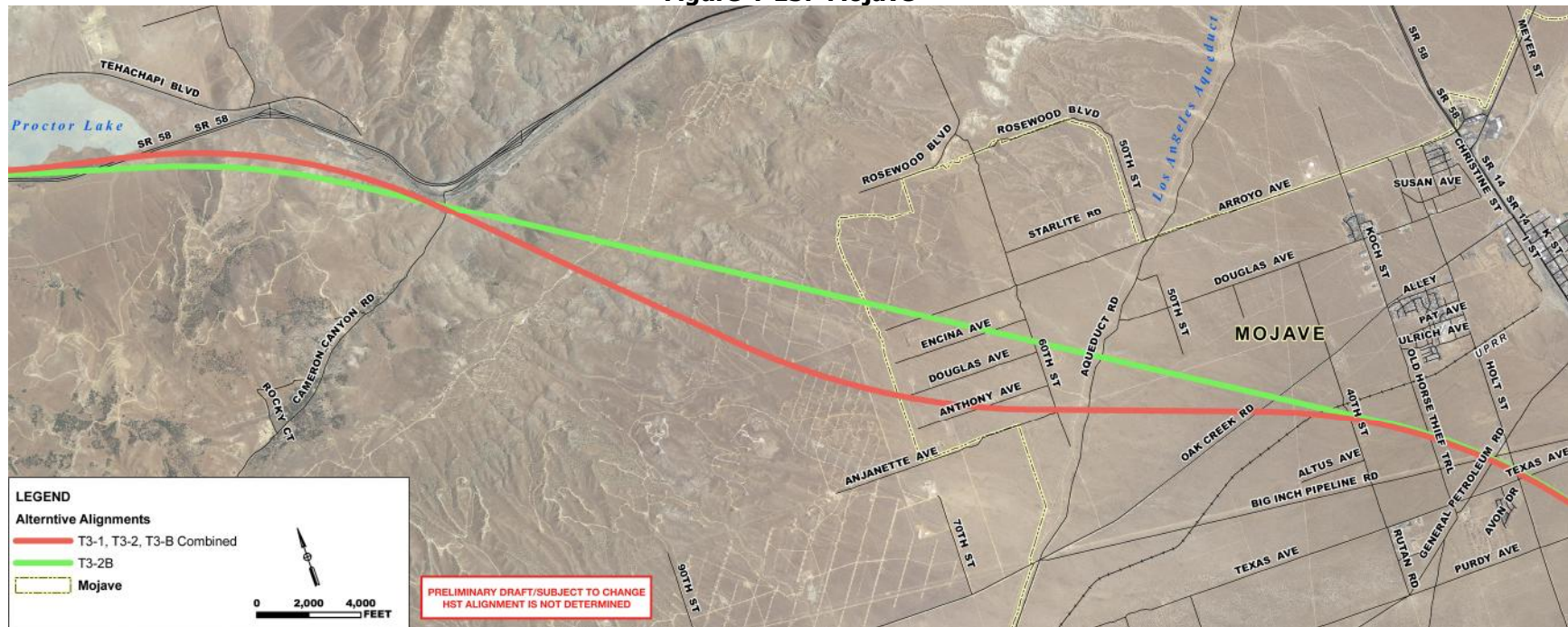
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Figure 4-13: Mojave



**Table 4-5: Alternatives Evaluation Analysis – Tehachapi Subsection**

<b>Project Alternative/ Option</b>	<b>Findings</b>	<b>Recommendation</b>
<b>T3-1</b> – Quantum-Generated Alignment	<ul style="list-style-type: none"> <li>• T3-1 offers an overall reduction in length and height of viaducts as compared to T3-2. T3-1 has the lowest capital cost, but does not provide Phase Break requirement.</li> <li>• Less endangered species habitat affected</li> </ul>	<b>Carry Forward</b>
<b>T3-2</b> – Modified Quantum-Generated Alignment	<ul style="list-style-type: none"> <li>• Most amount of agricultural parcels affected</li> <li>• Most amount of elevated structure, least of tunneling</li> <li>• Greatest maintenance cost because of the height and amount of elevated structures.</li> <li>• With T3-2B, crosses most acres of endangered species habitat</li> </ul>	<b>Carry Forward</b>
<b>T3-B</b> – Phase Break Alignment	<ul style="list-style-type: none"> <li>• Contains large cuttings and fillings of earth</li> <li>• 15% of the alignment is on viaduct and consists of several very tall structures (i.e. 150+ feet), increasing capital costs relative to T3-1.</li> <li>• Least amount of agricultural parcels affected</li> <li>• Less endangered species habitat affected</li> </ul>	<b>Carry Forward</b>
<b>T3-2B</b> – Revised Phase Break Alignment	<ul style="list-style-type: none"> <li>• Least amount of elevated structure, most tunneling, so highest capital cost</li> <li>• Lowest maintenance cost because least amount of elevated structure</li> <li>• Least amount of residential parcels affected</li> <li>• Similar to T3-2, crosses most acres of endangered species habitat</li> <li>• Reduces area of wetland impact in Proctor Lake</li> </ul>	<b>Carry Forward</b>



Figure 4-14: Tehachapi Alternatives Carried Forward

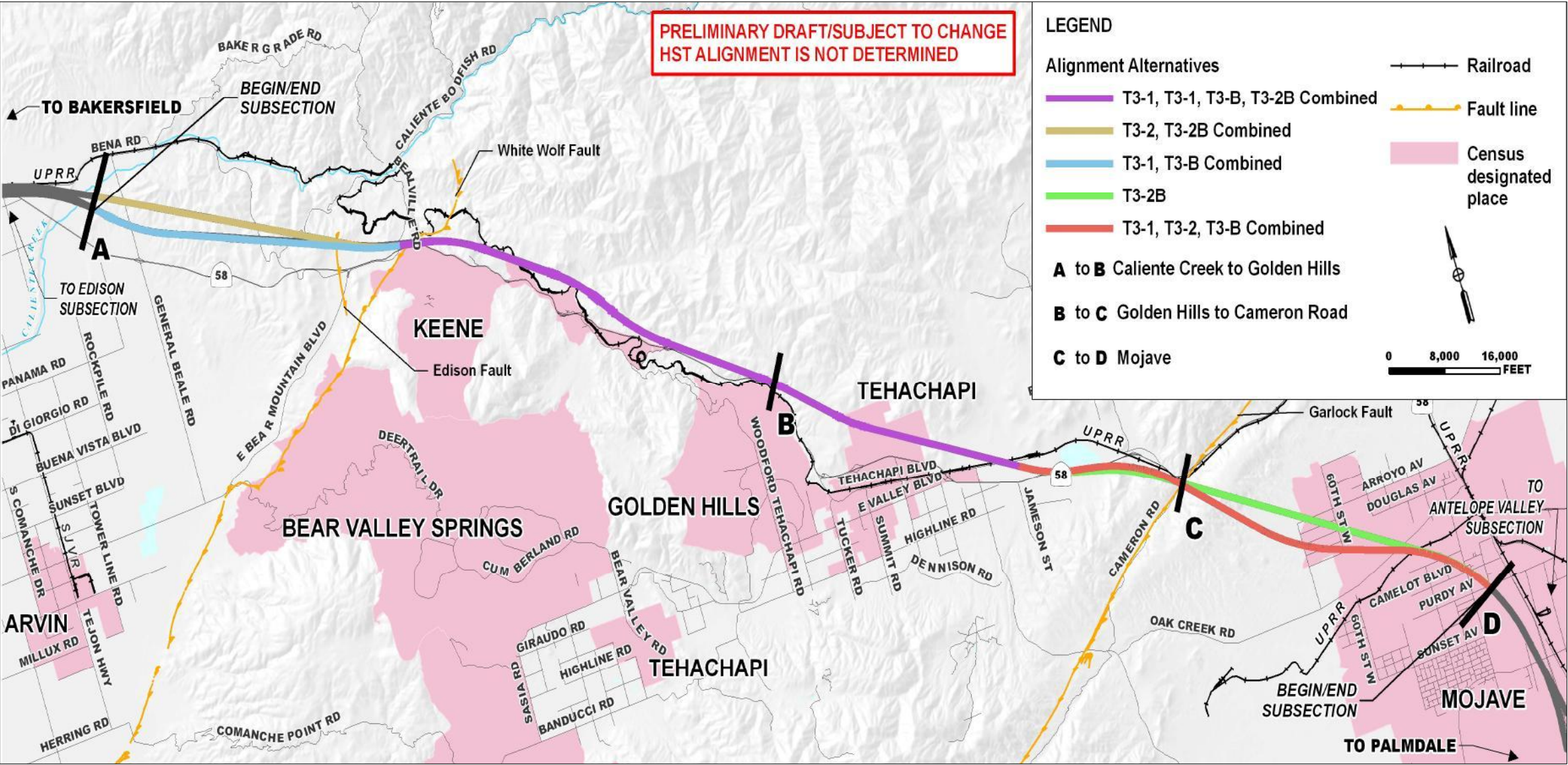


Table 4-6: Tehachapi Subsection Evaluation Summary

Category	Measurement	T3-1 Quantum-Generated Alignment	T3-2 Modified Quantum-Generated Alignment	T3-B Phase Break Alignment	T3-2B Revised Phase Break Alignment
		2.65% Average Slope, 2.75% Sustained Slope over 12 miles	2.5% Average Slope, 2.5% Sustained Slope over 20 miles	2.65% Average Slope, 3.5% Sustained Slope over 3.4 miles	2.5% Average Slope, 3.5% Sustained Slope over 3.4 miles
Disruption to Communities	Displacements	Alignment crosses: <ul style="list-style-type: none"><li>30 agricultural parcels (733 acres)</li><li>5 residential parcels (26 acres)</li><li>2 commercial parcels (5 acres)</li><li>13 industrial parcels (179 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>33 agricultural parcels (868 acres)</li><li>5 residential parcels (26 acres)</li><li>2 commercial parcels (5 acres)</li><li>13 industrial parcels (192 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>29 agricultural parcels (576 acres)</li><li>5 residential parcels (28 acres)</li><li>2 commercial parcels (5 acres)</li><li>13 industrial parcels (199 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>31 agricultural parcels (667 acres)</li><li>3 residential parcels (24 acres)</li><li>2 commercial parcels (4 acres)</li><li>14 industrial parcels (202 acres)</li></ul>
	Properties with access affected	Major property access (i.e. via local roads) will not be affected. Minor access roads and driveways may be affected where the alignment is at-grade. Much of the T segment is rural in nature where parcels are very large in size and existing access is very limited. These properties are mainly rural and mitigation strategies could provide alternate access points or provide grade separated access as required.			
	Local traffic effects around stations	Not applicable. No station location.			
	Local traffic effects at grade separations	The at-grade guideway for T3-1 would affect 4 minor roadways. "Minor roadways affected" refers to at-grade roadways impacted by HST where a decision is necessary to determine whether the road is closed or grade separated. Given that the affected local roads serve as primary access to much of the surrounding rural communities, access is critical and will need to be maintained. Grade separations would need to be made at Cameron Canyon Road, Holt St., and Purdy Ave.  The remaining 13 road crossings will consist of HST going over the local facilities.	Similar effect as T3-1. At-grade guideway would affect 3 minor roadways. Grade separations would need to be made at Cameron Canyon Road, Holt St., and Purdy Ave.  The remaining 14 road crossings will consist of HST going over the local facilities.		
Design Objectives	Travel time (220 mph)	Because the slope in this subsection, profile would affect rolling stock performance; a detailed speed model would need to be performed to accurately estimate the journey time.  All alignments would generally have a maximum speed of 220 mph in vicinity of Tehachapi and less than 220 mph on incline sections – depending on slopes.			
	Route length	Not a differentiator.  Total Length: 40.5 miles Elevated: 7.1 miles Tunnel: 12.2 miles	Not a differentiator.  Total Length: 40.4 miles Elevated: 10.9 miles Tunnel: 10.7 miles	Not a differentiator.  Total Length: 40.3 miles Elevated: 5.6 miles Tunnel: 13.7 miles	Not a differentiator.  Total Length: 40.4 miles Elevated: 5.1 miles Tunnel: 16.0 miles
	Intermodal connections	Not applicable. No station location.			
	Capital costs	T3-1 offers an overall reduction in length and height of viaducts as compared to T3-2. T3-1 has the lowest capital cost.	T3-2 has the most linear feet of elevated track. Elevated track is considerably taller and has longer continuous segments as compared to T3-1. T3-2 has greater capital cost than T3-1 and T3-B. .	Approximately 50% of the alignment is located at-grade and contains large cuttings and fillings of earth. 15% of the alignment is on viaduct and consists of several very tall structures (i.e. 150+ feet), increasing capital costs in relation to T3-1.	T3-2B has substantially more tunnel (30% more), than all alternatives, therefore has a greater capital cost.
	Operating costs	Not a differentiator.  Operating costs across all options will be very similar. There are no significant differing features of any of the alignments that would cause operating costs to vary.			
	Maintenance costs	For T3-1, length of elevated guideway slightly reduced over T3-2 lessening long term maintenance costs.	For T3-2, longer span and taller structures would entail the greatest maintenance cost off all the alternatives.	For T3-B, length of elevated guideway is reduced over T3-1, lessening long term maintenance costs.	For T3-2B, length of elevated guideway is reduced over T3-1, lessening long term maintenance costs.



Category	Measurement	T3-1 Quantum-Generated Alignment	T3-2 Modified Quantum-Generated Alignment	T3-B Phase Break Alignment	T3-2B Revised Phase Break Alignment
		2.65% Average Slope, 2.75% Sustained Slope over 12 miles	2.5% Average Slope, 2.5% Sustained Slope over 20 miles	2.65% Average Slope, 3.5% Sustained Slope over 3.4 miles	2.5% Average Slope, 3.5% Sustained Slope over 3.4 miles
Land Use	Potential for Transit Oriented Development	Not applicable. No station location.			
	Consistency with other planning efforts	Generally consistent with other planning efforts. All alignments would traverse planned residential, industrial, and commercial developments near Tehachapi, and a potential wind turbine development west of Mojave, however none of these are approved.			
Constructability	Constructability	All alignments have 2 crossings of the UPRR. Near Tehachapi, the crossing at Tehachapi Boulevard is skewed and may require columns on UPRR right-of-way and also may require straddle bent construction to carry the elevated guideway over the UPRR tracks.  Alignments cross SR-58 one time east of Tehachapi. This crossing may require column locations for the overcrossing structure on Caltrans right-of-way to avoid a costly clear span for this crossing. Early coordination with Caltrans to be performed for this crossing.  For access for construction, this is within the general proximity of SR-58 for most of the segment length. Existing local roads provide access for most of the construction, where other locations for tunnel/viaduct construction will require creating temporary access. Temporary construction access may become permanent access to tunnel/viaduct locations for maintenance and emergency purposes upon completion of the rail alignment.			
	Disruption to existing railroads	All alignments have 2 crossings of the UPRR. The crossing of UPRR and Tehachapi Boulevard near Tehachapi is skewed and may require columns and/or straddle bent construction on UPRR right-of-way. This skewed crossing of the UPRR may temporarily affect freight operation during construction.			
	Disruption to and relocation of utilities	The alignments cross 7 electric transmission lines operated by Bonneville Power, LA Dept. of Water & Power and SoCal Edison and 3 natural gas lines operated by Mojave Pipeline Co., PG&E and Sempra Energy. All utility crossings occur at the southern end of the alignment, between Tehachapi Boulevard and Purdy Avenue.  Alignment crosses 10 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>7 electric transmission lines</li></ul>			
Environmental Resources	Waterways/Sensitive Habitat Areas	Alignment has 41 waterways crossings, including: <ul style="list-style-type: none"><li>Clear Creek</li><li>Tehachapi Creek</li><li>Tweedy Creek</li><li>Unnamed waterways</li></ul> Crosses 10 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater emergent wetlands</li><li>Freshwater forested/shrub wetlands</li><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 33 acres of habitat for 4 threatened or endangered species: <ul style="list-style-type: none"><li>Blunt-nosed leopard lizard</li><li>California jewel-flower</li><li>San Joaquin woollythread</li><li>Tehachapi slender salamander</li></ul>	Alignment has 45 waterways crossings, including: <ul style="list-style-type: none"><li>Clear Creek</li><li>Tehachapi Creek</li><li>Tweedy Creek</li><li>Unnamed waterways</li></ul> Crosses 10 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater emergent wetlands</li><li>Freshwater forested/shrub wetlands</li><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 48 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>California jewel-flower</li><li>San Joaquin woollythread</li><li>Tehachapi slender salamander</li></ul>	Alignment has 43 waterways crossings, including: <ul style="list-style-type: none"><li>Clear Creek</li><li>Tehachapi Creek</li><li>Tweedy Creek</li><li>Unnamed waterways</li></ul> Crosses 10 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater emergent wetlands</li><li>Freshwater forested/shrub wetlands</li><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 32 acres of habitat for 4 threatened or endangered species: <ul style="list-style-type: none"><li>Blunt-nosed leopard lizard</li><li>California jewel-flower</li><li>San Joaquin woollythread</li><li>Tehachapi slender salamander</li></ul>	Alignment has 41 waterways crossings, including: <ul style="list-style-type: none"><li>Clear Creek</li><li>Tehachapi Creek</li><li>Tweedy Creek</li><li>Unnamed waterways</li></ul> Crosses 6 acres of wetland habitat, including: <ul style="list-style-type: none"><li>Freshwater emergent wetlands</li><li>Freshwater forested/shrub wetlands</li><li>Riverine</li><li>Other</li></ul> No crossing of designated critical habitat. Crosses 49 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>California jewel-flower</li><li>San Joaquin woollythread</li><li>Tehachapi slender salamander</li></ul>
	Cultural Resources	No impact on National Register of Historic Places listed structures.  Crosses 3 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 1 site listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 3 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures or CHRIS listed sites.
	Parklands	No direct or indirect impacts to parks.			
	Agricultural lands	Does not traverse any important agricultural lands.	Traverses 8 acres of important farmland; 0 acres classified as prime.	Does not traverse any important agricultural lands.	Traverses 8 acres of important farmland; 0 acres classified as prime.

Category	Measurement	T3-1 Quantum-Generated Alignment	T3-2 Modified Quantum-Generated Alignment	T3-B Phase Break Alignment	T3-2B Revised Phase Break Alignment
		2.65% Average Slope, 2.75% Sustained Slope over 12 miles	2.5% Average Slope, 2.5% Sustained Slope over 20 miles	2.65% Average Slope, 3.5% Sustained Slope over 3.4 miles	2.5% Average Slope, 3.5% Sustained Slope over 3.4 miles
	Noise and vibration	96 sensitive noise receptors: <ul style="list-style-type: none"><li>94 residential parcels</li><li>1 hospital</li><li>1 school</li></ul> 10 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>10 residential parcels</li></ul>	94 sensitive noise receptors: <ul style="list-style-type: none"><li>92 residential parcels</li><li>1 hospital</li><li>1 school</li></ul> 10 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>10 residential parcels</li></ul>	94 sensitive noise receptors: <ul style="list-style-type: none"><li>92 residential parcels</li><li>1 hospital</li><li>1 school</li></ul> 10 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>10 residential parcels</li></ul>	68 sensitive noise receptors: <ul style="list-style-type: none"><li>66 residential parcels</li><li>1 hospital</li><li>1 school</li></ul> 6 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>6 residential parcels</li></ul>
	Visual/scenic resources	4 residential parcels within quarter-mile of elevated structures.	9 residential parcels within quarter-mile of elevated structures.	9 residential parcels within quarter-mile of elevated structures.	5 residential parcels within quarter-mile of elevated structures.
	Geotechnical constraints	Crosses 8 faults: <ul style="list-style-type: none"><li>Garlock Fault, south branch</li><li>White Wolf Fault</li><li>Unnamed</li></ul> No highly erodible soils or identified landslide locations.	Crosses 8 faults: <ul style="list-style-type: none"><li>Garlock Fault, south branch</li><li>White Wolf Fault</li><li>Unnamed</li></ul> No highly erodible soils or identified landslide locations..	Crosses 10 faults: <ul style="list-style-type: none"><li>Garlock Fault, south branch</li><li>White Wolf Fault</li><li>Unnamed</li></ul> No highly erodible soils or identified landslide locations.	Crosses 10 faults: <ul style="list-style-type: none"><li>Garlock Fault, south branch</li><li>White Wolf Fault</li><li>Unnamed</li></ul> No highly erodible soils or identified landslide locations.
	Hazardous materials	No hazardous materials sites.			

### 4.3. ANTELOPE VALLEY SUBSECTION

#### 4.3.1. Alternatives

The four initial alternatives that were carried forward in the Antelope Valley (AV2, AV3, AV4, and AV4 Option) are listed in Table 4-7 and illustrated in Figure 4-15.

**Table 4-7: Antelope Valley Alternatives**

<b>Alternative</b>	<b>Description</b>
<b>AV2</b>	East side of UPRR (Mixed At-Grade and Elevated)
<b>AV3A</b>	Between UPRR and Sierra Highway (All At-Grade)
<b>AV3B</b>	Between UPRR and Sierra Highway (Partially Elevated)
<b>AV4</b>	Within or adjacent to Sierra Highway – January 2010 Alternative
<b>AV4 Option</b>	Similar to AV4, primarily adjacent to Sierra Highway, but completely avoiding UPRR property

#### 4.3.2. Evaluation

Consistent with the evaluation process outlined in Section 2.0, the alternatives were assessed against the project objectives and evaluation criteria. The resulting findings were then used to decide which alternatives were carried forward into preliminary engineering design and environmental review as part of the EIR/EIS. To facilitate comparison of the alternatives in the locations where trade-offs among alternatives are most apparent, the Antelope Valley Subsection was divided into three geographic subareas: Rosamond (Purdy Avenue to Lancaster limit) (A-B); Lancaster northern limit to Avenue J (B-C); and Avenue J to Avenue M (Lancaster-Palmdale boundary) (C-D) (see Figure 4-15). A summary of the evaluation of alternatives by geographic subarea is provided below.

#### 4.3.3. Major Issues in the Evaluation of Alternatives

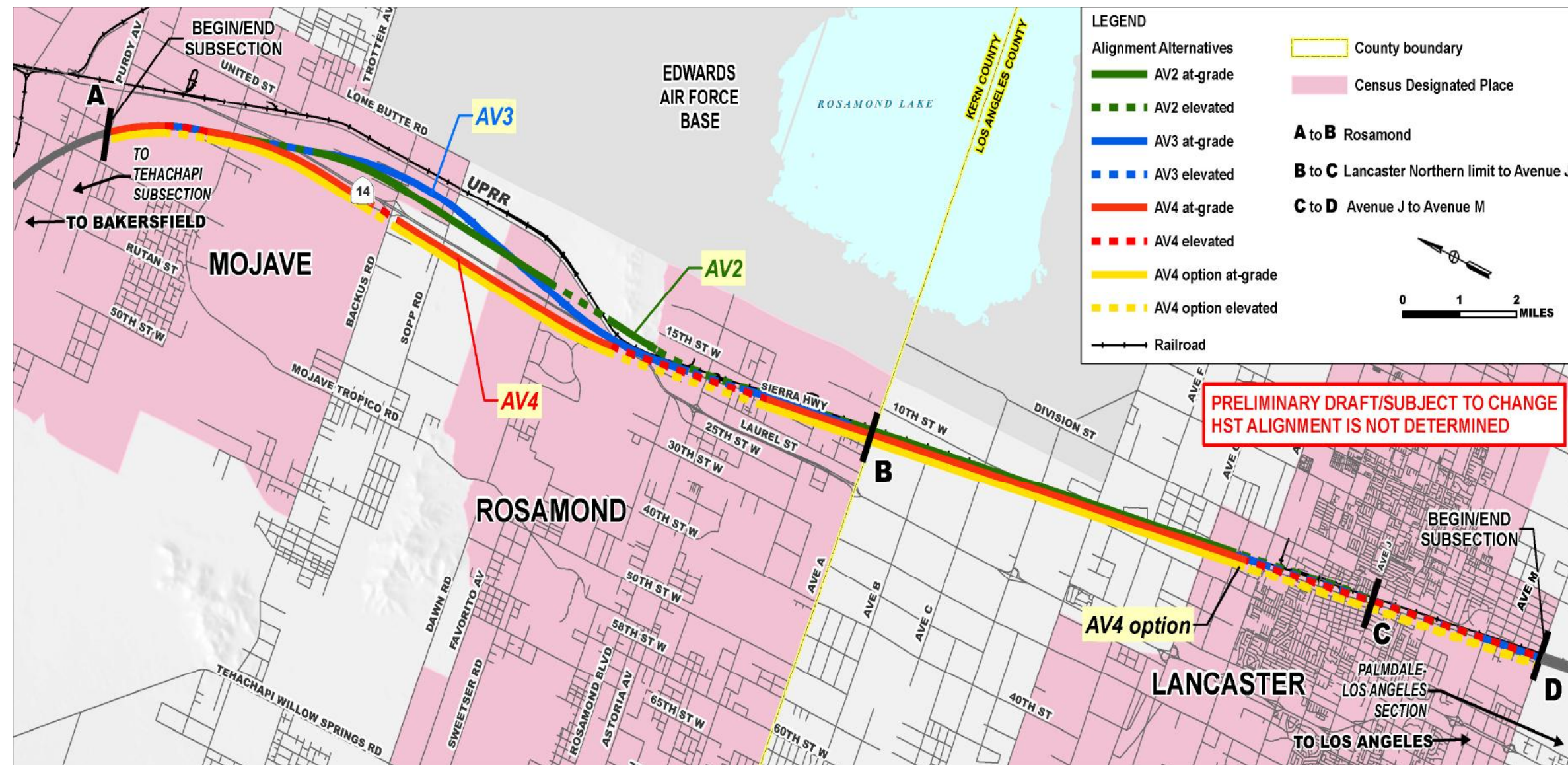
The major constraints in this subsection are listed below and are further described by geographic area in Section 4.3.4.

- Businesses affected in Rosamond and Lancaster
- Sierra Highway circulation and right-of-way
- Encroachment and crossings of UPRR
- Lancaster civic and transportation facilities affected
- Lancaster Boulevard redesign conflicts
- Roadways severed

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**Figure 4-15: Antelope Valley Overview**



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#### **4.3.4. Comparison of Alternatives by Geographic Subarea**

##### **Antelope Valley Subarea A-B: Rosamond (Purdy Avenue to Lancaster Northern City Limit)**

Figure 4-16 shows the Rosamond area of unincorporated Los Angeles County and the following summaries describe the alternative alignments as they affect the area.

##### **Alternative AV2 – East Side of UPRR**

Through Rosamond, Alternative AV2 crosses over the UPRR right-of-way to parallel the railroad on the east. Although there are no sensitive receptors, land use displacements, or physical constraints on the east, AV2 encroaches into undeveloped UPRR-owned property that expands beyond the nominal railroad right-of-way. Additionally, the AV2 overcrossing of UPRR north of Rosamond is on a skewed viaduct whose columns may be located within the nominal railroad right-of-way.

##### **Alternative AV3 – Between UPRR and Sierra Highway**

The Alternative AV3 at-grade option would require grade separations of Rosamond Boulevard and Avenue A, the primary arterials serving Edwards Air Force Base. Ultimately, the County expects to construct overpasses of the UPRR for those arterials. In this regard, the County wants to ensure that HST elevated alignments are designed to permit future overpass construction of Rosamond Boulevard and Avenue A. In addition, stakeholders requested that AV3 at-grade option should avoid severing Sierra Highway north of Rosamond.

##### **Alternatives AV4 and AV4 Option – Within or Adjacent to Sierra Highway**

Alternatives AV4 and AV4 Option travel along the west side of Sierra Highway. Although elevated through Rosamond, the alignments could displace businesses bordering Sierra Highway. As a result, stakeholders have requested that AV4 should be dropped or realigned through the community.

##### **Antelope Valley Subarea B-C: Lancaster Northern City Limit to Avenue J**

##### **Alternative AV2 – East Side of UPRR**

Between Avenue H and Avenue I, Alternative AV2 remains elevated in order to cross over Avenue H and Avenue I, an active rail spur line, and a retention basin. No industrial uses are displaced although a planned bleach factory would be adjacent to the alignment. Of the Antelope Valley alternatives, AV2 passes the fewest number of sensitive receptors.

South of Avenue I, AV2 traverses UPRR-owned property on the east side of the nominal railroad right-of-way, crossing over Lancaster Boulevard and passing through an area opposite the Metrolink Station designated as a proposed bus transfer facility by the City.

##### **Alternative AV3 – Between UPRR and Sierra Highway**

Alternative AV3 could be at grade or elevated aligned along the western edge of the UPRR right-of-way. Under either profile, AV3 would displace the Metrolink Station and some station parking. The at-grade option would also sever Lancaster Boulevard just east of Sierra Highway and would require the reconfiguration of some local streets and construction of a replacement crossing (see Figure 4-17). The City of Lancaster has objected to this alignment because of its potential impact to the redesign and reconstruction of Lancaster Boulevard and the desire to maintain the Lancaster Boulevard grade crossing of UPRR. South of the Metrolink Station, both AV3 options would displace multiple auto-related businesses located along the east side of Sierra Highway to Avenue J. The AV3 at-grade option would require Avenue J to be grade-separated.

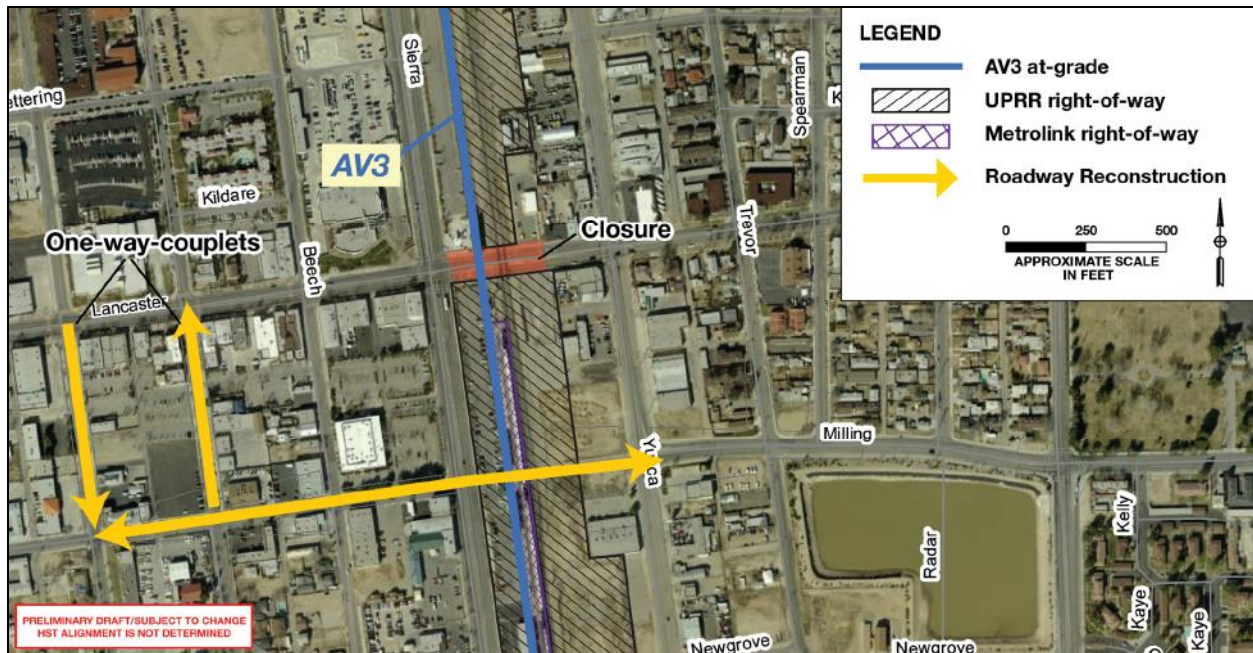


Figure 4-16: Rosamond Area





**Figure 4-17: Lancaster Boulevard Realignment**



#### **Alternative AV4 – Within or Adjacent to Sierra Highway**

Alternative AV4 travels along the western edge of Sierra Highway and, despite its elevated configuration, may impede access to Whit Carter Park and businesses lining Sierra Highway on the west, a major concern of stakeholders. AV4 completely misses the Metrolink Station area by remaining in the Sierra Highway right-of-way, but would require redesign of the highway and elimination of left-turn pockets at Lancaster Boulevard, a concern of City traffic engineers. In addition, the City expressed concern that AV4, by occupying the Sierra Highway right-of-way, may adversely affect the planned redesign of Lancaster Boulevard. As with AV3, south of the Metrolink Station, AV4 would closely parallel the railroad right-of-way and displace multiple auto-related businesses located along the east side of Sierra Highway to Avenue J.

#### **Alternative AV4 Option – UPRR ROW Avoidance**

Alternative AV4 Option is aligned to remain outside of UPRR property boundaries. It would avoid potential access impacts to businesses along the west side of Sierra Highway by crossing over Sierra Highway and remaining on the east side of the highway through this section. To avoid UPRR property south of Lancaster Boulevard, AV4 Option remains close to Sierra Highway on the east, avoiding the Metrolink Station, but displacing some station parking.

#### **Antelope Valley Subarea C-D: Avenue J to Avenue M**

##### **Alternatives AV2, AV3, and AV4 – West of UPRR, East of Sierra Highway**

South of Avenue J, Alternative AV2 begins to cross from east to west of the UPRR right-of-way on a long, skewed viaduct and joins Alternatives AV3 and AV4 on the west side of the UPRR right-of-way (see Figure 4-18). The viaduct columns would be constructed within the nominal railroad right-of-way. South of Avenue J, where AV2, AV3, and AV4 are parallel along the west side of UPRR, elevated structures would likely overhang the UPRR right-of-way and the columns would displace an existing bike path. Additional impacts would be generated by the AV3 at-grade option, which would encroach on the railroad right-of-way, displace the bike path, and require Avenue K to be grade-separated. All alternatives either pass over or under the Avenue L overpass of the UPRR and come to grade at Avenue M, requiring Avenue M to be grade-separated (see Figure 4-19).

**Figure 4-18: Avenue J**



**Figure 4-19: Avenue M**



#### **Alternative AV4 Option – UPRR ROW Avoidance**

AV4 Option completely avoids UPRR property by remaining adjacent to Sierra Highway, away from the railroad right-of-way. At Avenue J, AV4 Option uses a jog in Sierra Highway to cross from the east side to the west side of the highway, thereby maintaining the bike path south of Avenue J. By traveling along the western boundary of Sierra Highway, AV4 Option can be located in a vacant strip of land separating the highway from adjacent land uses. Within this undeveloped strip, columns for the elevated structure can be placed to minimize access impacts to adjacent businesses and to Antelope Valley University, which rely on Sierra Highway to provide their primary access. As with AV2, AV3, and AV4, this alternative comes to grade at Avenue M, requiring Avenue M to be grade-separated.

#### **4.3.5. Recommendations for Antelope Valley Subsection**

Table 4-8 summarizes the evaluation of alternatives for the Antelope Valley subsection and the recommendation whether the alternative or option have merit for being carried forward for further analysis in the EIR/EIS. The alternatives recommended to be carried forward are indicated in Figure 4-20. A more detailed account of the findings is presented in Table 4-9.



**Table 4-8: Alternatives Evaluation Analysis – Antelope Valley Subsection**

<b>Alt.</b>	<b>Notes</b>	<b>Recommendation</b>
<b>AV2-</b> East side of UPRR (Mixed At-Grade and Elevated)	<ul style="list-style-type: none"> <li>Affects access to the most parcels</li> <li>Highest capital cost of all alternatives</li> <li>Encroaches on multiple UPRR parcels</li> <li>Requires two long skewed crossings of UPRR, requiring column placement for the elevated structure to be within the railroad right-of-way</li> </ul>	<b>Not Carried Forward</b>
<b>AV3A -</b> Between UPRR and Sierra Highway (All At-Grade)	<ul style="list-style-type: none"> <li>Requires closing or grade separating major east-west arterials</li> <li>Conflicts with City redesign of Lancaster Boulevard and severs Lancaster Boulevard at Sierra Highway</li> <li>Displaces the Lancaster Metrolink Station and some parking</li> <li>May require realignment of a portion of Sierra Highway</li> <li>Displaces multiple commercial properties south of the Metrolink Station</li> <li>Displaces existing bike path</li> <li>Encroaches on UPRR property outside the nominal railroad right-of-way</li> <li>Lowest capital cost of all alternatives</li> <li>Lowest operating costs because less energy requirements due to the at-grade configuration</li> </ul>	<b>Not Carried Forward</b>
<b>AV3B -</b> Between UPRR and Sierra Highway (Partially Elevated)	<ul style="list-style-type: none"> <li>Displaces the Lancaster Metrolink Station and some parking</li> <li>May require realignment of a portion of Sierra Highway</li> <li>Displaces existing bike path</li> <li>Encroaches on UPRR property outside the nominal railroad right-of-way</li> <li>Displaces multiple commercial properties south of the Metrolink Station</li> </ul>	<b>Carried Forward</b>
<b>AV4 -</b> Within or adjacent to Sierra Highway – January 2010 Alternative	<ul style="list-style-type: none"> <li>May require realignment of a portion of Sierra Highway</li> <li>Along with AV4 Option, affects the most residential parcels for noise and vibration</li> <li>May impede access to local businesses and Whit Carter Park</li> <li>May conflict with redesign of Lancaster Boulevard</li> <li>Displaces some Lancaster Metrolink Station parking</li> <li>Encroaches on UPRR property outside the nominal railroad right-of-way</li> <li>Displaces multiple commercial properties south of the Metrolink Station</li> </ul>	<b>Not Carried Forward</b>
<b>AV4 Option -</b> Within or adjacent to Sierra Highway – UPRR Avoidance Option	<ul style="list-style-type: none"> <li>Completely avoids UPRR property</li> <li>May affect access to commercial properties south of Avenue J</li> <li>Along with AV4, affects the most residential parcels for noise and vibration</li> <li>May require redesign of Sierra Highway north of Avenue I</li> </ul>	<b>Carried Forward</b>

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Figure 4-20: Antelope Valley Alternatives Carried Forward

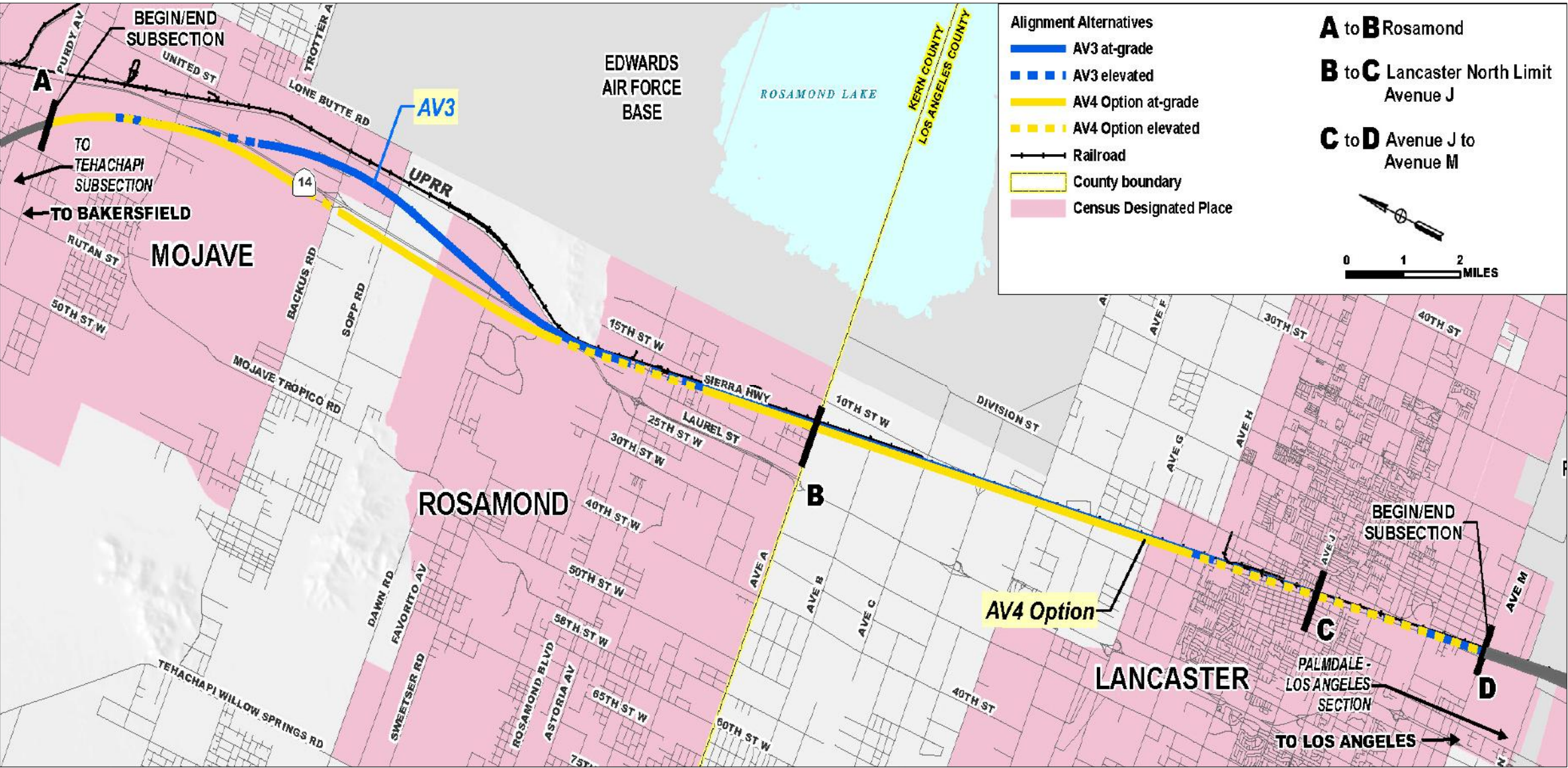


Table 4-9: Antelope Valley Subsection Evaluation Summary

Dark gray shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. Gray shading in the table body indicates the reason for that recommendation.

Category	Measurement	AV2 East Side of UPRR	AV3 Between UPRR and Sierra Highway		AV4 Within or Adjacent to Sierra Highway	AV4 Option UPRR ROW Avoidance
		Mixed At-Grade and Elevated	All At-Grade (AV3A)	Partially Elevated (AV3B)	Primarily Elevated	Primarily Elevated
Disruption to Communities	Displacements	Alignment crosses: <ul style="list-style-type: none"><li>2 agricultural parcels (1 acre)</li><li>13 residential parcels (13 acres)</li><li>80 commercial parcels (10 acres)</li><li>47 industrial parcels (30 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>0 agricultural parcels (0 acres)</li><li>22 residential parcels (13 acres)</li><li>114 commercial parcels (21 acres)</li><li>32 industrial parcels (11 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>0 agricultural parcels (0 acres)</li><li>22 residential parcels (13 acres)</li><li>114 commercial parcels (21 acres)</li><li>32 industrial parcels (11 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>0 agricultural parcels (0 acres)</li><li>24 residential parcels (19 acres)</li><li>177 commercial parcels (34 acres)</li><li>43 industrial parcels (38 acres)</li></ul>	Alignment crosses: <ul style="list-style-type: none"><li>0 agricultural parcels (0 acre)</li><li>24 residential parcels (20 acres)</li><li>148 commercial parcels (55 acres)</li><li>37 industrial parcels (38 acres)</li></ul>
	Properties with access affected	For AV2, approximately 254 parcels would be impacted from Rosamond to Palmdale. The type of parcels include mostly commercial and industrial.	For AV3A, numerous private and Caltrans parcels would be affected from Mojave to Rosamond. Approximately 109 parcels would be impacted from Rosamond to Palmdale. The type of parcels include: commercial, industrial, public road, UPRR right-of-way and Metrolink right-of-way.	For AV3B, numerous private and Caltrans parcels would be affected from Mojave to Rosamond. Approximately 109 parcels would be impacted from Rosamond to Palmdale. The type of parcels include: commercial, industrial, public road, UPRR right-of-way and Metrolink right-of-way.  The alignment would be on an elevated guideway, therefore consideration would be given to column placement to minimize impacts to property access and land use under the elevated guideway.	For AV4, 240 parcels would be impacted from Rosamond to Palmdale. The type of parcels include mostly commercial and industrial.	Similar to AV4, but columns on west side of Sierra Highway would need to be placed to avoid restricting access to adjacent businesses.
	Local traffic effects around stations	Not applicable. No station location.				
	Local traffic effects at grade separations	"Minor roadways affected" refers to at-grade roadways impacted by HST where a decision is necessary to determine whether the road is closed or grade separated. In addition, existing grade separations and interchanges may need to be adjusted to accommodate HST alignments/profiles. Redesign of roadways could cause LOS impacts during construction.  The number of existing grade crossings to be adjusted is 7.	The number of existing grade crossings to be adjusted is 16.  The existing overcrossings at Avenue H and Avenue L will be impacted and may require modifications.	The number of existing grade crossings be adjusted is 11.  The existing overcrossings at Avenue H and Avenue L will be impacted and may require modifications	The number of existing grade crossings to be adjusted is 16.	The number of existing grade crossings to be adjusted is 16.
Design Objectives	Travel time (220 mph)	7 minutes - 7 seconds	7 minutes - 7 seconds	7 minutes - 7 seconds	7 minutes - 5 seconds	7 minutes - 5 seconds
	Route length	Total Length: 25.5 miles Elevated: 11.1 miles Tunnel: 0.0 miles	Total Length: 25.6 miles Elevated: 0.0 miles Tunnel: 0.0 miles	Total Length: 25.6 miles Elevated: 0.0 miles Tunnel: 0.0 miles	Total Length: 25.5 miles Elevated: 7.7 miles Tunnel: 0.0 miles	Total Length: 25.5 miles Elevated: 7.7 miles Tunnel: 0.0 miles
	Intermodal connections	Not applicable. No station location.				



Category	Measurement	AV2 East Side of UPRR	AV3 Between UPRR and Sierra Highway		AV4 Within or Adjacent to Sierra Highway	AV4 Option UPRR ROW Avoidance
		Mixed At-Grade and Elevated	All At-Grade (AV3A)	Partially Elevated (AV3B)	Primarily Elevated	Primarily Elevated
	Capital costs	AV2 has the highest capital costs of all AV alternatives, with the most elevated structure compared to AV3 and AV4 and long skewed crossings over UPRR.	Entire AV3A alignment would be at grade. Therefore, AV3A has the lowest cost since no HST elevated structures are needed.	AV3B has a medium-range capital cost. Less than one-third of the alignment is on elevated structure. AV3B has less elevated structure than AV4.	AV4 has a medium-range capital cost with approximately one-third of the alignment on elevated structure.	AV4 has a medium-range capital cost with approximately one-third of the alignment on elevated structure.
	Operating costs	For AV2, operating costs for this alternative would be greater Than AV3 due to the length and height of structures. Higher undulations and would increase energy costs.	Follows existing ground, therefore AV3A would have fewer undulations and would require less energy and costs to operate.	Operating costs for AV3B would be slightly greater than AV3A because a portion of this alignment rises on elevated structures.	Operating costs for AV4 would be greater than AV3 due to the length and height of structures. Higher undulations and would increase energy costs.	Operating costs for AV4 would be greater than AV3 due to the length and height of structures. Higher undulations and would increase energy costs.
	Maintenance costs	For AV2, accessibility to the elevated structures would increase maintenance costs at Rosamond and Lancaster.	AV3A would have better access to maintenance personnel.	Same as AV2.	Same as AV2.	Same as AV2.
Land Use	Potential for Transit Oriented Development	Not applicable. No station location.				
	Consistency with other planning efforts	AV2 would traverse a multiple planned and approved projects including the Lancaster Water Reclamation Plant, Avenue K Transmission Line, Sierra Sun Tower Generating Station, and Hasa Bleach Manufacturing Plant.	AV3 and AV4 would traverse a multiple planned and approved projects including the Lancaster Water Reclamation Plant and the Avenue K Transmission Line. However, they would avoid the Sierra Sun Tower Generating Station and Hasa Bleach Manufacturing Plant.			
Constructability	Constructability	AV2 is predominately east of the UPRR right-of-way on undeveloped properties from Rosamond to Palmdale. Two HST Overpasses of UPRR will be on, skewed viaducts, requiring placement within UPRR ROW.  Regarding access for construction, all alignment options are within urban limits and therefore construction access is easily achievable. Access to UPRR property for column installations would require coordination with the respective railroad.	AV3A is predominately between UPRR right-of-way and Sierra Highway from Rosamond to Palmdale. Sierra Highway and Lancaster Boulevard may have to be redesigned. Portions of UPRR property are utilized to construct this alternative.  Regarding access for construction, alternatives are within urban limits or in very close proximity of transportation arterial and therefore construction access is easily achievable. Access to UPRR property for column installations would require coordination with the respective railroad.	Same as AV3A.  May encroach on Portions of UPRR property and requires some redesign of Sierra Highway but, unlike AV3A, Lancaster Boulevard would be unaffected by HST construction.	For AV4, access on UPRR property may be needed south of Avenue J in Lancaster.  Construction access would be provided via existing Sierra Highway and local roads. Linear access would require right of entry from UPRR.	AV4 Option entirely avoids UPRR right-of-way, AV4 Option avoids Sierra Highway by crisscrossing it near Avenue H and Avenue J.  Construction access is similar to AV4
	Disruption to existing railroads	AV2 does not involve disruption to existing railroad operations. Coordination will be necessary for construction of two flyovers (north of Rosamond and north of Avenue J).	AV3A does involve disruption to existing railroad operations. The alignment would require encroachment into UPRR and Metrolink right-of-way. Metrolink facilities at Lancaster Station would be impacted.	Same as AV3A.	AV4 does not involve disruption to existing railroad operations. The alignment would require encroachment into UPRR and Metrolink right-of-way.	AV4 Option does not involve disruption to existing railroad operations.

Category	Measurement	AV2 East Side of UPRR	AV3 Between UPRR and Sierra Highway		AV4 Within or Adjacent to Sierra Highway	AV4 Option UPRR ROW Avoidance
		Mixed At-Grade and Elevated	All At-Grade (AV3A)	Partially Elevated (AV3B)	Primarily Elevated	Primarily Elevated
	Disruption to and relocation of utilities	AV2 crosses 10 electric transmission lines operated by Southern California Edison and 4 natural gas lines operated by Sempra Energy. The crossings occur all along the alignment.  Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>10 electric transmission lines</li></ul>	Same as AV2.  Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>10 electric transmission lines</li></ul>	Same as AV2.  Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>10 electric transmission lines</li></ul>	AV4 crosses 6 electric transmission lines operated by Southern California Edison, Los Angeles Department of Water and Power and Bonneville Power and 4 natural gas lines operated by Sempra Energy, Mojave Pipeline Co. and PG&E. The crossings occur all along the alignment.  Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>10 electric transmission lines</li></ul>	Similar to AV4.  Alignment crosses 13 utilities: <ul style="list-style-type: none"><li>3 natural gas lines</li><li>10 electric transmission lines</li></ul>
Environmental Resources	Waterways/Sensitive Habitat Areas	Alignment has 16 unnamed waterways crossings. No crossing of wetland or designated critical habitat. Crosses 46 acres of habitat for 1 threatened or endangered species: <ul style="list-style-type: none"><li>Mojave ground squirrel</li></ul>	Alignment has 10 unnamed waterways crossings. No crossing of wetland or designated critical habitat. Crosses 46 acres of habitat for 1 threatened or endangered species: <ul style="list-style-type: none"><li>Mojave ground squirrel</li></ul>	Alignment has 10 unnamed waterways crossings. No crossing of wetland or designated critical habitat. Crosses 46 acres of habitat for 3 threatened or endangered species: <ul style="list-style-type: none"><li>California Tiger Salamander</li><li>California Jewel-Flower</li></ul>	Alignment has 11 unnamed waterways crossings. No crossing of wetland or designated critical habitat. Crosses 45 acres of habitat for 1 threatened or endangered species: <ul style="list-style-type: none"><li>Mojave ground squirrel</li></ul>	Alignment has 11 unnamed waterways crossings. No crossing of wetland or designated critical habitat. Crosses 44 acres of habitat for 1 threatened or endangered species: <ul style="list-style-type: none"><li>Mojave ground squirrel</li></ul>
	Cultural Resources	No impact on National Register of Historic Places listed structures.  Crosses 4 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 12 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 12 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 22 sites listed in the CHRIS database.	No impact on National Register of Historic Places listed structures.  Crosses 18 sites listed in the CHRIS database.
	Parklands	No direct impacts to parks.  2 parks (18 acres) located within quarter-mile of the alignment.	No direct or indirect impacts to parks.  2 parks (24 acres) located within quarter-mile of the alignment.	No direct or indirect impacts to parks.  2 parks (24 acres) located within quarter-mile of the alignment.	The alignment may impact 0.9 acre of Whit Carter Park.  2 parks (28 acres) located within quarter-mile of the alignment.	The alignment may impact 0.3 acre of Whit Carter Park.  2 parks (28 acres) located within quarter-mile of the alignment.
	Agricultural lands	Does not traverse any important agricultural lands.				
	Noise and vibration	632 sensitive noise receptors: <ul style="list-style-type: none"><li>630 residential parcels</li><li>2 churches</li></ul> 119 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>119 residential parcels</li></ul>	927 sensitive noise receptors: <ul style="list-style-type: none"><li>925 residential parcels</li><li>1 church</li><li>1 school</li></ul> 275 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>275 residential parcels</li></ul>	927 sensitive noise receptors: <ul style="list-style-type: none"><li>925 residential parcels</li><li>1 church</li><li>1 school</li></ul> 275 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>275 residential parcels</li></ul>	1,098 sensitive noise receptors: <ul style="list-style-type: none"><li>1,094 residential parcels</li><li>2 churches</li><li>2 schools</li></ul> 358 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>358 residential parcels</li></ul>	1,112 sensitive noise receptors: <ul style="list-style-type: none"><li>1,108 residential parcels</li><li>2 churches</li><li>2 schools</li></ul> 380 sensitive vibration receptors within 275 feet of the alignment: <ul style="list-style-type: none"><li>380 residential parcels</li></ul>
	Visual/scenic resources	325 residential parcels within quarter-mile of elevated structures.	1 residential parcel within quarter-mile of elevated structures.	1,153 residential parcels within quarter-mile of elevated structures.	1,471 residential parcels within quarter-mile of elevated structures.	1,319 residential parcels within quarter-mile of elevated structures.
	Geotechnical constraints	No known seismic faults. No highly erodible soils or identified landslide locations.				
	Hazardous materials	3 hazardous materials sites.	8 hazardous materials sites.	8 hazardous materials sites.	10 hazardous materials sites.	14 hazardous materials sites.
Note: <b>Dark gray</b> shading in the table Header indicates which alternatives were not recommended to be carried forward to the environmental review. <b>Gray shading</b> in the table body indicates the reason for that recommendation.						



## 5.0 SUMMARY AND CONCLUSIONS

### 5.1. RESULTS FROM THE PRELIMINARY ALTERNATIVES ANALYSIS

#### **Purpose and Location**

This Preliminary Alternatives Analysis Report for the Bakersfield to Palmdale Section identifies feasible and practicable high-speed train (HST) study alternatives to carry forward for environmental review and evaluation in the draft environmental impact report/environmental impact statement (EIR/EIS) under the California Environmental Quality Act (CEQA) and the National Environmental Policy Act (NEPA).

The environmental document for the Bakersfield to Palmdale Section will include the area between the Bakersfield and Palmdale HST Stations. However, for the purposes of this Alternatives Analysis(AA), study area boundaries have been set by match points with the Fresno to Bakersfield Section on the north and the Palmdale to Los Angeles Section on the south. Within those limits, the Bakersfield to Palmdale section has been divided into three subsections having widely varying topography, climate, and land use (see Figures ES-1 through ES-3). The subsections are (from north/west to south/east):

- **Edison (E)** – Begins east of the Bakersfield HST Station at Edison Highway/Oswell Street, passes through the unincorporated community of Edison, and follows SR-58 before crossing Caliente Creek. This Central Valley subsection consists mainly of industrial and residential land uses in the west and agricultural land uses in the east.
- **Tehachapi (T)** – Begins east of Caliente Creek, passes over the Tehachapi Mountains to the high desert west of Mojave, and ends near SR-14 and Purdy Avenue in Mojave. This subsection includes forest, desert, mountain areas, some residential land uses, and light industrial facilities.
- **Antelope Valley (AV)** – Begins at Purdy Avenue in Mojave, generally parallels Sierra Highway and the UPRR through the desert communities of Rosamond and Lancaster, and ends at Avenue M between the cities of Lancaster and Palmdale. The Antelope Valley Subsection runs through primarily low density urban land uses separated by extended open areas.

No HST stations are located between Bakersfield and Palmdale.

#### **Recommendations**

The following alignment alternatives are recommended to be carried forward for detailed study in the Bakersfield to Palmdale Section HST Project EIR/EIS:

##### **Edison Subsection**

- E2A: SR-58 Adjacent North Side (Partially Elevated)
- E2B: SR-58 Adjacent North Side (All Elevated)
- E4: Along Edison Highway, Through Town of Edison (All Elevated)

##### **Tehachapi Subsection**

- Alternative T3-1 – Quantum-Generated Alignment
- Alternative T3-2 – Modified Quantum-Generated Alignment
- Alternative T3-B – Phase Break Alignment
- Alternative T3-2B – Revised Phase Break Alignment

### **Antelope Valley Subsection**

- AV3B: Between UPRR and Sierra Highway (Partially Elevated)
- AV4 Option: Within or Adjacent to Sierra Highway – Completely avoids UPRR Right-of-way (Primarily Elevated)

The recommended alternatives through the Edison Subsection parallel either Edison Highway or SR-58, and are fully or elevated or partially elevated.

The recommended alternatives in the Tehachapi Subsection are a combination of elevated, tunnel, and at-grade sections that, in general, parallel State Route (SR)-58, but follow a more direct path to maintain design standards and optimum slopes. Two of the alternatives allow for a traction power phase break facility in a relatively flat area west of the community of Keene.

The recommended alternatives in the Antelope Valley Subsection are primarily elevated through Rosamond and Lancaster but would be built at grade in the less developed areas adjacent to the west side of the UPRR and Sierra Highway.

Table ES-1 summarizes the findings and recommendations of this AA for all alignment alternatives considered. Alignments recommended to be carried forward into the EIR/EIS are shown in Figure ES-4. Those study alternatives recommended not to be carried forward into the EIR/EIS are shown in Figures ES-5 and ES-6.

## **5.2. NEXT STEPS**

This Preliminary AA Report for the Bakersfield to Palmdale Section will be used to help prepare the Project Description for the EIR/EIS, which will set forth the parameters for the next level of design and stage of environmental analysis. Specific activities will include:

- Board Action to Accept Staff Recommendations on Alternatives to be Carried Forward
- Continue to meet with Stakeholders and the Public
- Prepare Supplemental AA Reports As Required
- Begin Environmental Studies and 15% Design
- Complete Draft EIR/EIS by July 2012
- Complete Final EIR/EIS by March 2013

As the engineering and environmental work continues, the Authority will also continue to meet with community groups, elected officials, and the public with an interest in the Bakersfield to Palmdale Section. This ongoing work will also provide the Authority, FRA and the communities in the Bakersfield to Palmdale Section with a more complete description of both the design options in each subsection and a comprehensive vision of the entire corridor.

A Supplemental Alternatives Analysis report will be prepared to describe further developments and changes to the range of study alternatives based on design or engineering refinements and response to comments received by the Authority and FRA on the Preliminary Alternatives Analysis Report.

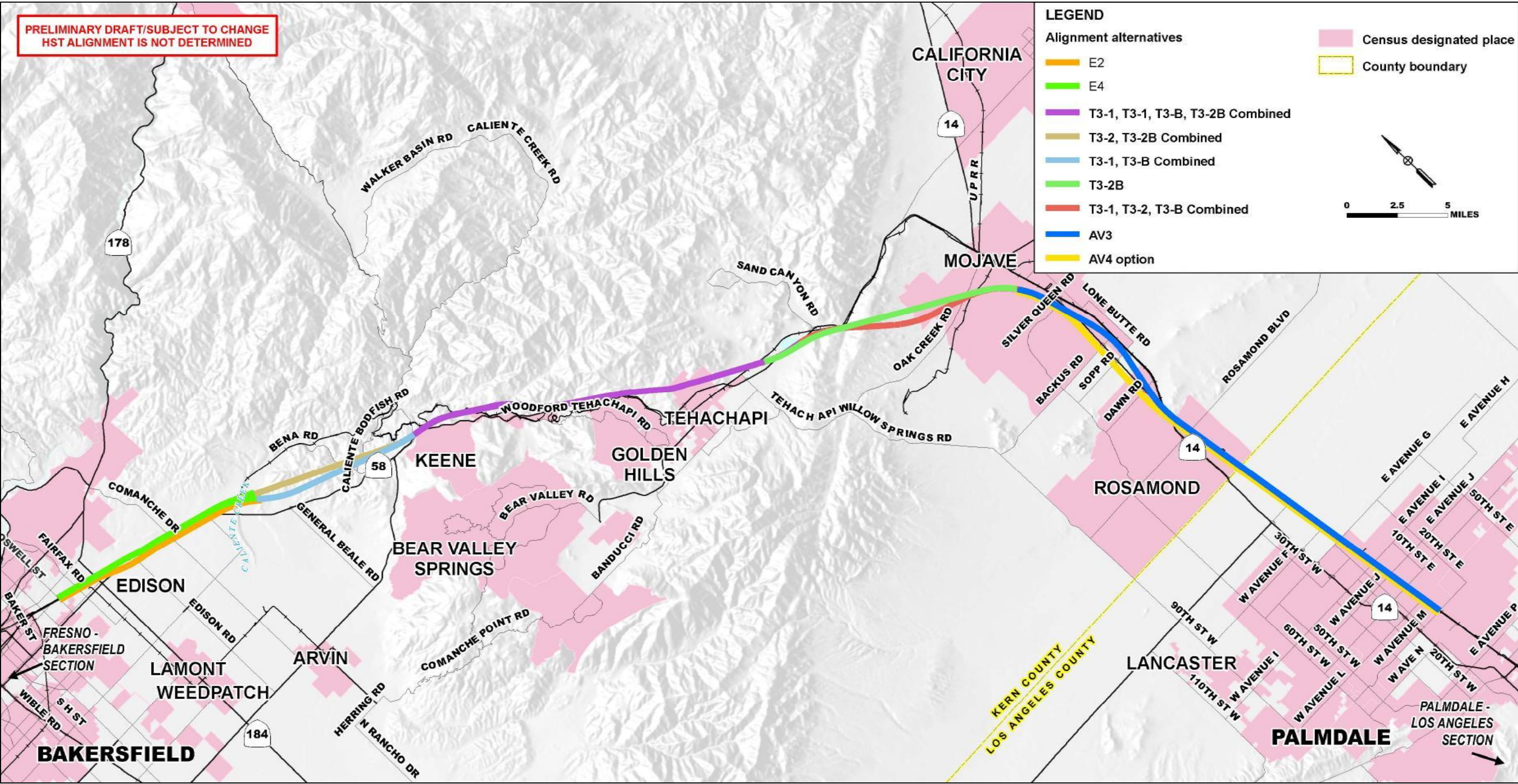
Table 5-1: Alignment Alternatives Considered

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P—Primary S—Secondary)							ENVIRONMENTAL/OTHER CONCERNS	
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment		
Edison Subsection											
E2A: SR-58 Adjacent North Side (Partially At-Grade)	X									Requires reconstruction of five interchanges along SR 58; Lower construction costs resulting from at-grade construction would be increased by reconstruction of multiple SR-58 interchanges; 157 acres of agricultural land would be permanently displaced,	
E2B: SR-58 Adjacent North Side (All Elevated)	X									Displaces slightly less acreage of farmland than E2A, but allows possibility of replanting crops underneath elevated structures along the north side of SR 58; Requires some reconstruction of SR-58 ramps	
E3: In SR-58 Median (All Elevated)		X	P		S				S	Would require a 2-mile realignment of SR-58 and reconstruction of multiple overpasses to conform with HST geometry or use of massive straddle bents spanning the freeway; Lengthy approval process from Caltrans required; Realignment and reconstruction of SR-58 would displace 81 acres of farmland; Highest capital cost and greatest length of elevated alignment; Construction and maintenance of HST structures within the SR-58 right-of-way would require temporary closure of freeway lanes with coordination and approval from Caltrans.	
E4: Along Edison Highway (All Elevated)	X									Least amount of agricultural land affected; Requires less roadway reconstruction than E2 and E3 Alternatives; Would affect the most residential parcels; Offers opportunity to place HST columns in county right-of-way or undeveloped strip of land adjacent to Edison Highway; HST alignment passes near but does not displace school facilities or residences in community of Edison; May impede access to packing and shipping plants along Edison Highway; Requires minor realignment of Edison Highway and redesign to improve vehicle circulation through the community of Edison	
Tehachapi Subsection											
T3-1: Quantm-Generated Alignment, 2.65% Average Slope, 2.75% Sustained Slope over 12 miles	X									T3-1 offers an overall reduction in length and height of viaducts as compared to T3-2, and has the lowest capital cost;; Does not allow “phase break for” traction power facilities; Crosses least amount of endangered species habitat..	
T3-2: Modified Quantm-Generated Alignment, 2.5% Average Slope, 2.5% Sustained Slope over 20 miles	X									Most amount of agricultural parcels affected; Most amount of elevated structure, least of tunneling; Higher capital cost than T3-2; Greatest maintenance cost because of the height and amount of elevated structures; Like T3-2B, crosses most acres of endangered species habitat.	
T3-B: Phase Break Alignment, 2.65% Average Slope, 3.5% Sustained Slope over 3.4 miles	X									Contains large cuttings and fillings of earth; 15% of the alignment is on viaduct and consists of several very tall structures (i.e. 150+ feet), increasing capital costs relative to T3-1 and T3-2; Least amount of agricultural parcels affected and less endangered species habitat than T3-2.	
T3-2B: Revised Phase Break Alignment, 2.5% Average Slope, 3.5% Sustained Slope over 3.4 miles	X									Least amount of elevated structure, most tunneling, so highest capital cost; Lowest maintenance cost because least amount of elevated structure; Least amount of residential parcels affected; Similar to T3-2, crosses most acres of endangered species habitat; Reduces area of wetland impact in Proctor Lake	

ALIGNMENT ALTERNATIVE/STATION LOCATION AND DESIGN OPTIONS	AA DECISION		REASONS FOR ELIMINATION (P—Primary S—Secondary)							
	Carried Forward	Withdrawn	Construction	Incompatibility	Right-of-Way	Connectivity/ Accessibility	Revenue/ Ridership	Community Impact	Environment	
ENVIRONMENTAL/OTHER CONCERNS										
Antelope Valley Subsection										
AV2: East Side of UPRR (Mixed At-Grade and Elevated)		X	P		P			S		Affects access to the most parcels; Highest capital cost of all alternatives; Encroaches on multiple UPRR parcels; Requires two long skewed crossings of UPRR, requiring column placement for the elevated structure to be within the railroad right-of-way
AV3A: Between UPRR and Sierra Highway (All At-Grade)		X	P	P	P			S		Lowest capital cost of all alternatives; Lowest operating costs because less energy requirements due to the at-grade configuration; Requires closing or grade separating major east-west arterials; Conflicts with City redesign of Lancaster Boulevard and severs Lancaster Boulevard at Sierra Highway; Displaces the Lancaster Metrolink Station and some parking; Requires realignment of a portion of Sierra Highway; Displaces multiple commercial properties south of the Metrolink Station; Displaces existing bike path; Encroaches on UPRR property outside the nominal railroad right-of-way.
AV3B: Between UPRR and Sierra Highway (Partially Elevated)	X									Displaces the Lancaster Metrolink Station and some parking; Requires realignment of a portion of Sierra Highway; Displaces existing bike path; Encroaches on UPRR property outside the nominal railroad right-of-way; Displaces multiple commercial properties south of the Metrolink Station
AV4: Within or Adjacent to Sierra Highway (Primarily Elevated)		X			P			P		Requires realignment of a portion of Sierra Highway; Along with AV4 Option, affects the most residential parcels for noise and vibration; Conflicts with access to some local businesses and Whit Carter Park; Conflicts with redesign of Lancaster Boulevard; Displaces some Lancaster Metrolink Station parking; Encroaches on UPRR property outside the nominal railroad right-of-way; Displaces multiple commercial properties south of the Metrolink Station
AV4 Option: Within or Adjacent to Sierra Highway – UPRR Avoidance Option (Primarily Elevated)	X									Completely avoids UPRR property; Conflicts with access to some commercial properties south of Avenue J; Along with AV4, affects the most residential parcels for noise and vibration; Requires redesign of Sierra Highway north of Avenue I



Figure 5-1: Alternatives Carried Forward



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U.S. Department  
of Transportation  
Federal Railroad  
Administration



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# CALIFORNIA HIGH-SPEED TRAIN

Project Environmental Impact Report /  
Environmental Impact Statement

## Working Draft

Bakersfield to Palmdale

## Preliminary Alternatives Analysis Report

### Volume II

September 2010



California High-Speed  
Rail Authority



U.S. Department of Transportation  
Federal Railroad Administration



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## California High-Speed Train Project



### Bakersfield to Palmdale Section Project EIR/EIS

# ALTERNATIVES ANALYSIS REPORT DRAFT

## VOLUME II – APPENDICES

Appendix A	Alternatives Analysis Methods for Project EIR/EIS
Appendix B	Alternatives Analysis GIS Data Sources
Appendix C	No Project Alternative
Appendix D	Outreach Summary Reports
	D-1 - Edison Subsection
	D-2 - Tehachapi Subsection
	D-3 - Antelope Valley Subsection

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## **APPENDIX A**

### **Alternatives Analysis Methods for Project-Level EIR/EIS**

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## **APPENDIX B**

### **Alternatives Analysis GIS Data Sources**

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## Alternatives Analysis GIS Data Sources Bakersfield to Palmdale Section

No.	GIS Data Source
1	Platts, 2007-2008, Fuel and Electric Transmission Lines. Provided by URS Denver office in 2008 (they have a subscription to the database).
2	Kern County, and Southern California Association of Governments (SCAG), existing land use data. County assessor use descriptions provided by Kern County, June 2008, via email. SCAG Existing land use data provided by URS Santa Ana office in October 2009.
3	California Spatial Information Library (CASIL), hydrologic features, 1995-1999. Downloaded from <a href="http://casil.ucdavis.edu/casil/">http://casil.ucdavis.edu/casil/</a> in 2006.
4	US Fish & Wildlife Service, National Wetlands Inventory, 1976-2002. Downloaded from <a href="http://www.fws.gov/wetlands/Data/DataDownload.html">http://www.fws.gov/wetlands/Data/DataDownload.html</a> in January 2009 and January 2010.
5	US Fish & Wildlife Service, Critical Habitat Boundaries, 2002-2006. Downloaded from <a href="http://criticalhabitat.fws.gov/">http://criticalhabitat.fws.gov/</a> in January 2009.
6	California Dept. of Fish & Game, California Natural Diversity Database (CNDDDB), January 2010. Received data via email link as part of regular bi-monthly subscription.
7	National Park Service, National Register of Historic Places, February 2001. Received data on disk from PB in April 2007.
8	Culturally significant sites and previously surveyed areas, California Historic Information System (CHRIS), December 2009. Data collected by URS at CHRIS center, and then digitized into GIS.
9	Kern County and USGS, Parks. Park locations extracted from Kern County parcel data (2008), and from USGS Geographic Names Information System (GNIS), downloaded from <a href="http://geonames.usgs.gov/domestic/download_data.htm">http://geonames.usgs.gov/domestic/download_data.htm</a> in December 2008.
10	California Dept. of Conservation, Farmland Mapping and Monitoring Program (FMMP), Important Farmlands, 2006. Downloaded from <a href="http://redirect.conservation.ca.gov/DLRP/fmmp/product_page.asp">http://redirect.conservation.ca.gov/DLRP/fmmp/product_page.asp</a> in 2008.
11	USGS GNIS, NPS National Historic Register and Kern and Los Angeles County residential parcels, noise and vibration receptors, 2005-2008. Concert Halls, Concert Pavilions, Hospitals, Libraries, Places of Worship, Schools, and Theater Locations pulled from
12	California Dept. of Conservation, Division of Mines and Geology, faults, (Jennings), 1994. Data provided on disk from CDMG in November 2008.
13	US Dept. of Agriculture, Natural Resources Conservation Service (NRCS), Soil Survey Geographic Database, Erodible Soils, 2007-2008. Downloaded from soil data mart website <a href="http://soils.usda.gov/survey/geography/ssurgo/">http://soils.usda.gov/survey/geography/ssurgo/</a> in September 2009 and January 2010.
14	EPA, Facilities Database, California Dept. of Toxic Substances Control Envirostor and Geotracker databases, hazardous materials sites, 2009. Data downloaded from <a href="http://geotracker.swrcb.ca.gov/data_download.asp">http://geotracker.swrcb.ca.gov/data_download.asp</a> , <a href="http://www.envirostor.dtsc.ca.gov/public/d">http://www.envirostor.dtsc.ca.gov/public/d</a>

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## **APPENDIX C**

### **No Project Alternative**

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## No Project

This section describes the No Project Alternative established to address state and federal environmental requirements. The No Project serves as a baseline to compare conditions with and without the Project.

### No Project Alternative

With respect to high-speed train service, the No Project Alternative presents conditions as they would be if the statewide HST system is not built. As shown in Figure C-1, the No Project Alternative represents the state's transportation system (highways, transit, air and conventional rail) in the Bakersfield-Palmdale section as it is currently configured and as it would be after implementation of programs or projects that are currently identified in regional transportation plans (RTPs), have identified funds for implementation, and are expected to be in place by 2035, the study's horizon year. The financially-constrained level of infrastructure improvement (based on expected federal, state, regional, and local funding) was analyzed in consideration of the considerable growth in population and transportation demand that is projected to occur by 2035. This section also identifies local development projects that are funded and within one-quarter mile of the alignment. Table C-4 summarizes and identifies by number the projects shown on Figure C-1.

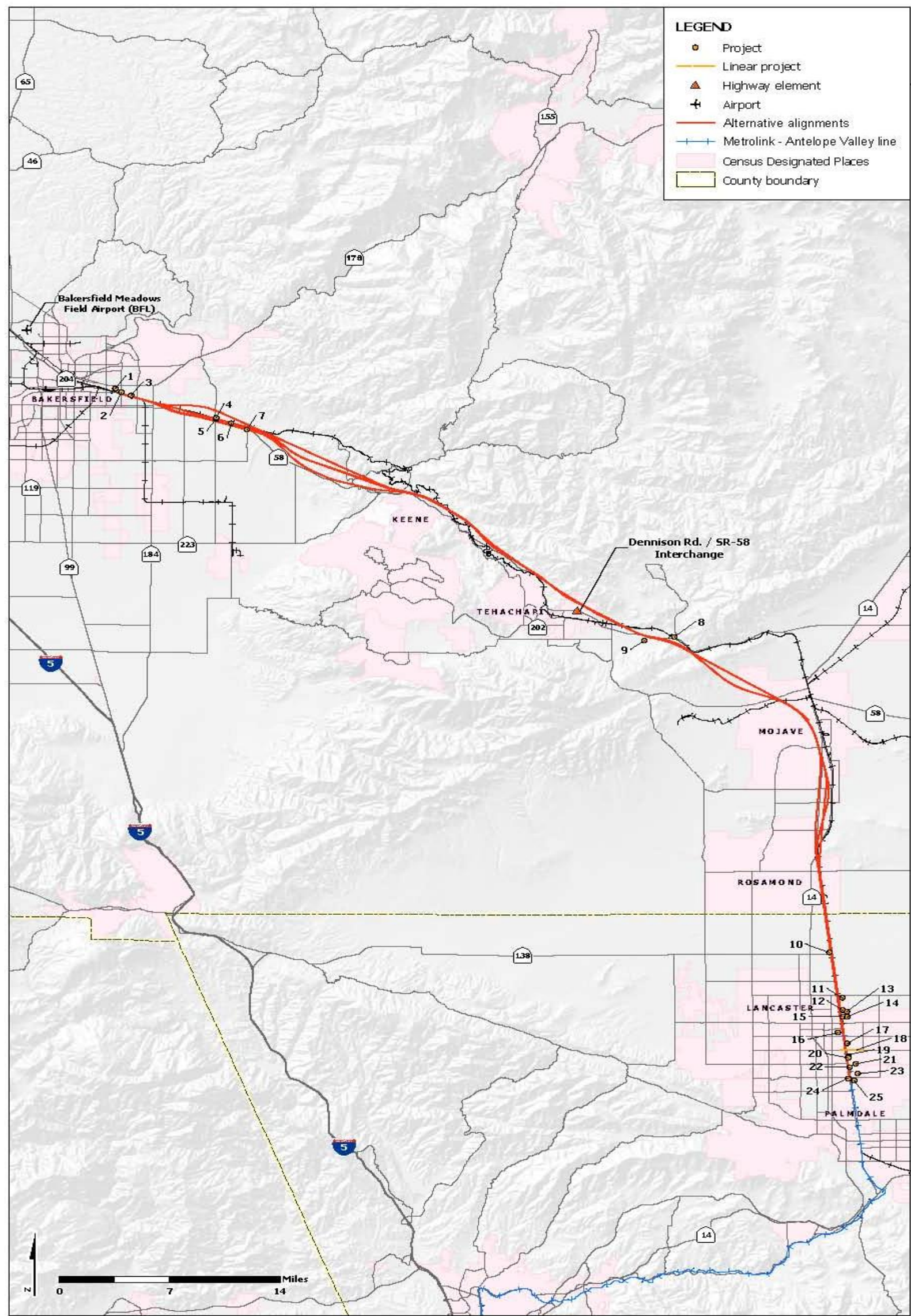
The No Project Alternative satisfies the statutory requirements under CEQA and NEPA for an alternative that does not include any new action or project beyond what is already committed. The No Build Alternative is based on the following sources of information:

- State Transportation Improvement Program (STIP)
- Regional Transportation Plans (RTPs); financially constrained projects for all modes of travel
- The State of California Office of Planning and Research CEQAnet Database
- Federal Aviation Administration (FAA)
- Airport Master Plans
- City and county general plans and interviews with planning officials
- Inncity passenger rail plans

The future improvements that would be part of the No Project Alternative are also included under the HST Build Alternatives as part of the future 2035 baseline. The No Project Alternative includes conventional passenger rail, highway, transit, aviation, and development projects within one-quarter mile of the alignment as discussed in the proceeding section.

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Figure C-1: No Project Alternative – Highway, Aviation and Passenger Projects and Local Development Projects



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## Highway Element

The highway element of the No Project Alternative consists of existing intercity travel routes serving the Bakersfield to Palmdale. These routes are listed in Table C-1 and shown on Figure C-1.

**Table C-1: Existing Routes, Bakersfield to Palmdale**

Existing State Routes
SR-14, SR-58, SR-138, SR-202, SR-223

The No Project Alternative includes the existing highway system as well as funded and programmed improvements based upon financially constrained RTPs for Kern and Los Angeles Counties. The following highways are located within the study area and are described in Table C-1.

The Kern Council of Governments (KCOG) RTP and Southern California Council of Governments (SCAG) RTP were used to gather planned highway related projects for the study area. The KCOG RTP contained one project in the study area, the SCAG RTP contained none. The project identified in the KCOG RTP is the SR-58 Interchange and Bridge project, located at Dennison Road and Tehachapi Boulevard in the City of Tehachapi (KCOG, 2007). The project is assumed to be in operation by 2035. The location of this project is shown on Figure C-1 as "Dennison Rd/SR-58 Interchange."

## Aviation Element

The aviation element of the No Project Alternative consists of one airport currently providing commercial service in the Bakersfield to Palmdale Section study area, namely Meadows Field Airport (BFL) in Bakersfield. Meadows Field Airport is north of Bakersfield and east of SR-99 and SR-65. The airport serves two airline carriers with domestic flights. The airport has two runways, and in 2006 opened the new William M. Thomas Air Terminal. The renovated old passenger terminal functioned as an international arrivals terminal and U.S. Customs facility until Mexicana Airlines cancelled its service from Bakersfield to Guadalajara, Mexico in 2007 (Gotcher, 2010). In 2009, BFL served approximately 121,261 passengers (FAA, 2010). BFL provides service for the Bakersfield region, connecting Bakersfield with Los Angeles (LAX) and San Francisco (SFO). The location of BFL is shown on Figure C-1 and the existing infrastructure is summarized in Table C-2. This information was primarily gathered from the BFL Airport Master Plan and interviews with airport officials.

The Palmdale Regional Airport (PMD), located east of SR-14 between Lancaster and Palmdale, previously offered commercial service, but in 2009 Los Angeles World Airports closed the commercial facility (Los Angeles Sentinel, 2009; Los Angeles Times, 2009).

**Table C-2: Meadows Field Airport - Existing (2010) Facilities**

<b>Airport</b>	<b>Total Passenger Terminal Size</b>	<b>Enplaned Passengers (annual)<sup>1</sup></b>	<b>Percent of In-State Passengers</b>	<b>Number of Runways</b>	<b>Number of Gates</b>	<b>Number of Lanes of Primary Access Road</b>	<b>Number of Parking Spaces</b>	<b>Size of Airport (acres)</b>
Meadows Field Airport (BFL)	64,800 square feet <sup>1</sup>	121,261 <sup>2</sup>	6% <sup>3,4</sup>	2 <sup>1</sup>	5 <sup>1</sup>	4	1,009 <sup>1</sup>	1,400 <sup>1</sup>
<b>Sources:</b> 1. Coffman Associates, Inc., 2006. Airport Master Plan. Meadows Field Airport, Bakersfield, California. December 2006. 2. FAA, 2010. APO Terminal Area Forecast Detail Report: BFL. <a href="http://aspm.faa.gov/main/taf.asp">http://aspm.faa.gov/main/taf.asp</a> . Accessed March 2, 2010. 3. Gotcher, Jack, Director, Meadows Field Airport, 2010. Personal correspondence with Christopher Wolf of URS Corporation. March 16, 2010. 4. Hitchcock, Teresa, Airports Analysis & Marketing Manager, Meadows Field Airport, 2009. Personal correspondence with Alison Drury of URS Corporation. August 18, 2009.								

Airport development is different from the highway and rail development in that it is not completely documented in RTPs or the STIP. Furthermore, because some airport improvements are funded by a combination of private and public sources, there is limited public documentation identifying confirmed airport projects that are likely to be in operation in 2035.

In order to conceptualize a 2035 No Project Alternative airport system, the following criteria have been used to review proposed airport improvements and determine their viability for implementation and operation by 2035. Proposed airport improvements were evaluated based upon a review of publicly available documentation; interviews with airport planning and development representatives; public agencies; and local area knowledge. An airport improvement is deemed likely to be implemented and in operation by 2035 if the improvement meets the following criteria:

- The improvement has been identified in an airport master planning program (either approved or under development), environmental document, regional aviation system planning document, or capital improvement program.
- The airport improvement would be funded and in place by 2035.

Table C-3 summarizes the airport improvements likely to be funded, programmed, and operational by 2035.

**Table C-3: Meadows Field Airport - Programmed, Funded, and Operational Airport Improvements, by 2035**

<b>Airport</b>	<b>Passenger Terminal Size</b>	<b>Runways</b>	<b>Gates</b>	<b>Primary Access Lanes</b>	<b>Parking Spaces (On and Off Site)</b>
Bakersfield Meadows Field Airport (BFL)	14,900 square feet <sup>1,2</sup>	1 <sup>3</sup>	21 <sup>1,2</sup>	1 <sup>1,2</sup>	701 <sup>3</sup>
<b>Sources:</b> <ol style="list-style-type: none"> <li>1. Gotcher, Jack, Director, Meadows Field Airport, 2010. Personal correspondence with Christopher Wolf of URS Corporation. March 16, 2010.</li> <li>2. Hitchcock, Teresa, Airports Analysis &amp; Marketing Manager, Meadows Field Airport, 2009. Personal correspondence with Alison Drury of URS Corporation. August 18, 2009.</li> <li>3. Coffman Associates, Inc., 2006. Airport Master Plan. Meadows Field Airport, Bakersfield, California. December 2006.</li> </ol>					

### Conventional Passenger Rail

There is currently no Conventional Passenger Rail system traversing the entire study area from Bakersfield to Palmdale. There is only one passenger rail line that operates anywhere within the study area: Metrolink. Metrolink is a commuter train service that operates in southern California. It was formed as a Joint Powers Authority composed of Los Angeles County Transportation Commission, Orange County Transportation Authority, Riverside County Transportation Commission, San Bernardino Associated Government, and Ventura County Transportation Commission. It operates seven routes within California and serves a small portion (approximately 3.6 miles) of the study area in the Antelope Valley. Metrolink's Antelope Valley line operates from Union Station in Los Angeles to Lancaster Station in Lancaster, the only station in the study area.

Amtrak does not operate any routes within the study area, but has operations directly north of the study area at Bakersfield, and south of the area at Union Station in Los Angeles. While Amtrak has previously discussed the possibility of operating rail service from Bakersfield to Los Angeles, nothing is planned at this time. However, Amtrak does offer commuter bus services from Bakersfield to Los Angeles and Bakersfield to Victorville, via Tehachapi, Mojave, Rosamond, Lancaster, and Palmdale. These services are essentially designed to bridge the gap in Amtrak's service from Bakersfield to Los Angeles. There are seven daily round trips from Bakersfield to Los Angeles, and two daily trips from Bakersfield to Victorville. At this time there is no plan to expand these commuter bus services.

### Local Development

The local development element of the No Project Alternative consists of funded local and regional plans and/or projects that would be located in or within one-quarter mile of the Bakersfield to Palmdale alignment.

Table C-4 summarizes the funded local development projects. Figure C-1 shows the location of these projects.

**Table C-4: Funded or Planned Local Developments within One-Quarter Mile of Alignment**

<b>Project</b>	<b>Location</b>	<b>Figure C-1 ID</b>
Vesting Tentative Tract	Pioneer Drive at Gargano Street, Bakersfield	1
General Plan Amendment 11/Zone Change 29/Precise Development Plan 10	Pioneer Drive at Oswell Street, Bakersfield	2
Kern Citrus Tank Project	Eucalyptus Drive and Dorothy Street, Bakersfield	3
Edison Field, Racetrack Hill Area	Comanche Road and Edison Highway, Kern County	4
Amendment to Metropolitan Bakersfield General Plan	Edison Highway and Comanche Drive, Bakersfield	5
Naftex Operating Company Franchise	Edison Highway at Tejon Highway, Bakersfield	6
Conditional Use Permit No. 11	Tower Line Road and Highway 58, Edison	7
Tehachapi Sanitary Landfill Permit Revision Project	Tehachapi Boulevard/Sand Canyon Road, Tehachapi	8
GE Solar, LLC	Jameson Street and Chantico Road, Tehachapi	9
Lancaster Water Reclamation Plant	Sierra Highway and Avenue D, Lancaster	10
Site Plan Review 08-01: Sierra Sun Tower Generating Station	Avenue G, Sierra Highway, and Division Street, Lancaster	11
Site Plan Review: Lumber Building Materials Facility	Trevor Avenue and Avenue H, Lancaster	12
Tentative parcel: Six Industrial Parcels	Division Street and future Avenue H-4, Lancaster	13
General Plan Amendment: Lancaster	Avenue H and Avenue I, and 10th Street East and 10th Street West, Lancaster	14
HASA Bleach Manufacturing Plant Project	Trevor Avenue and Avenue H-8, Lancaster	15
Downtown Lancaster Specific Plan: Development Project	Lancaster Boulevard, 10th Street West, Sierra Highway, Lancaster	16
Tentative Tract: 39 Single Family units	Division St and Avenue J-8, Lancaster	17
Avenue K Transmission Main, Phases I-IV	Avenue K between 5th Street and 10 <sup>th</sup> Street, Lancaster	18
Aquifer Storage and Recovery Well and Transmission Project	East Avenue K-8/North Division Street, Lancaster	19
Antelope Valley Aquifer Storage and Recovery Project	Division Street and Avenue K-8, Lancaster	20
Site Plan Review: Diesel Truck Repair Shop	5 <sup>th</sup> Street East and Avenue L, Lancaster	21
Tentative Parcel Map: 45 Industrial Units	Sierra Highway/Avenue L-4, Lancaster	22
Site Plan Review 06-18 and 06-19	Avenue L-12 and 6 <sup>th</sup> Street East, Lancaster	23
Site Plan Review: Credit Union	Sierra Highway and Avenue M, Palmdale	24
Palmdale Hybrid Power Plant Project	East Avenue M, Palmdale.	25

Source: CEQAnet, 2010.



## **APPENDIX D**

### **Outreach Summary Reports**

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## Overview: Bakersfield to Palmdale Section

### Agency Coordination and Public Outreach

The refined alternatives were presented for agency, stakeholder, and general public input. Outreach efforts began in September of 2009 and continue through today. During this period, outreach has been conducted to local elected leaders and local stakeholders in the communities of Edison, Tehachapi, and Antelope Valley. Separate Technical Working Group (TWG) and Public Information Meetings (PIMs) were held in each community to discuss the alignment design as well as local issues.

### Scoping Meetings

During the scoping period, three public scoping meetings were held between September 15 and 17, 2009, with a total of 189 people attending the three meetings. The Authority and FRA received a total of 50 written comments from individuals and organizations (comment cards, emails, transcriptions) and 15 comments from agencies, and 2 comments from private businesses on the proposed project. The following are summaries of the comments provided in conjunction with the scoping meetings.

A number of commenters noted the benefits of HST, including economic benefits, job creation, and air quality improvements. Primary concerns about the Bakersfield to Palmdale HST alignment included the identification of land use conflicts with proposed alignments and suggestions for new or modified alignments, including concerns regarding the displacement of residents and devaluation of property. In addition, agricultural impacts, air quality impacts, natural resources impacts, earthquake (seismic concerns), floodplain impacts, noise impacts, recreation impacts, and parking and transit connections at stations were identified.

Commenters, including the California Public Utilities Commission, and representatives of BNSF Railway (BNSF) and Union Pacific Railroad (UPRR), expressed concern over potential HST impacts to the safety of highway and rail crossings, and the operation of existing railroad facilities. In particular, UPRR noted a variety of technical issues, including that the UPRR right-of-way varies in width through the Bakersfield to Palmdale corridor and stated their belief that shared use of its track would not be feasible (UPRR, 2008).

One commenter expressed concern over the potential HST conflict with its proposed development of a solar energy facility in the Tehachapi region and requested its project be considered in the alignment design and evaluation of the HST project.

### TWG and PIM Meetings

For each of the subsections, the Authority held several types of outreach meetings. These meetings included TWGs and PIMs. The TWGs consisted of senior transportation, planning, and public works staff representing state and local agencies in the HST corridor. The Authority worked with local stakeholders to form TWGs to serve as liaisons to the HST project. In addition, after the formal environmental scoping period ended, the Authority hosted several PIMs throughout the Bakersfield to Palmdale Section.

### Other Stakeholder Outreach

In addition to the outreach efforts described above, the Authority met with local officials in several public meetings, in which Authority representatives provided project updates and responded to questions concerning the project. The Authority has also continued to meet with landowners and other interested parties to discuss their concerns and questions regarding the HST project.

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## **APPENDIX D-1**

### **Outreach Summary Report – Edison Subsection**

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## Edison Outreach Summary Report September 2009 – August 2010

### Overview

Our team assisted planning staff in developing alternatives analyses and preparations for scoping meetings, which were held on September 15, 2009 in Bakersfield and a Bakersfield TWG meeting that took place on March 31, 2010. During this period, outreach was conducted to local elected leaders in Bakersfield regarding station planning, scoping meetings, and next steps for HST on our alignment. General outreach presentations were also given to local stakeholders in the community of Edison. Assistance was also provided to the statewide outreach in distributing information on American Recovery and Reinvestment Act (ARRA) funding and the Heavy Maintenance Facility criteria.

### Edison TWG Meetings

#### Bakersfield TWG – March 31, 2010

General overview of the project

- Status of funding and schedule.

Discussion of program alignment, engineering design criteria and local issues.

- Presented overview of alignment through Bakersfield along with the Palmdale section through Kern County.

Station Planning

- Station Ownership
- Station Structures
- Architectural Design

### Outreach Meetings

The following meetings were conducted or are scheduled to take place from September 2009 through August 2010.

Date	Meeting	CHSRA Representative(s)	Contact	Notes
9/15/2009	Bakersfield to Palmdale Scoping Meeting in Bakersfield	Bakersfield-Palmdale JV Outreach Team	Eric VonBerg	Agency/organization representatives and members of the public attended the scoping meeting, providing comments on alternatives.
3/31/2010	Kern County Planning Staff (Sara Kopp and Chris Mynk)	Tom Tracy, Mark Weisman, Eric VonBerg, Gene Tackett	Gene Tackett	Gathered information from the County on planned energy and road projects on or near HST alignment.

Date	Meeting	CHSRA Representative(s)	Contact	Notes
3/31/2010	Bakersfield TWG	Tom Tracy, Mark Weisman, Eric VonBerg, Gene Tackett, Bob Lagomarsino	Gene Tackett	Presented overview of alignment through Bakersfield along with the Palmdale section through Kern County.
3/31/2010	Big L Packers	Mark Weisman, Eric VonBerg, Gene Tackett	Gene Tackett	Briefing on HST project to Edison stakeholders, which is a potential Environmental Justice community.
3/31/2010	Rick Stevens, Stevens Transportation	Gene Tackett, Mark Weisman	Gene Tackett	Briefing on HST project to Edison stakeholders, which is a potential Environmental Justice community. For Bolthouse Farms, Edison Highway
4/1/2010	Kern County Roads and Planning Staff (Warren Maxwell and Cheryl Casdorff)	Mark Weisman, Gene Tackett	Gene Tackett	Gathered information from the County on planned road projects on or near HST alignment.
4/1/2010	James Daigle, ADS Hancor, Edison Hwy	Mark Weisman, Gene Tackett	Gene Tackett	Briefing on HST project to Edison stakeholders, which is a potential Environmental Justice community.
4/1/2010	George Guimarra Jr., Guimarra Vineyards, Edison Hwy	Mark Weisman, Gene Tackett	Gene Tackett	Briefing on HST project to Edison stakeholders, which is a potential Environmental Justice community.
4/14/2010	Bakersfield Rotary Club	Gene Tackett, Eric VonBerg, Mark Weisman	Gene Tackett	General outreach
4/15/2010	Edison Potato Shed Farmers	Gene Tackett, Mark Weisman	Gene Tackett	Briefing on HST project to ag business owners in Edison, which is a Environmental Justice community.
4/15/2010	Edison School District Superintendent (Stephen M. Ventura)	Gene Tackett, Mark Weisman	Gene Tackett	Briefing on HST project to Edison stakeholders, which is a potential Environmental Justice community.
4/16/2010	San Joaquin Valley Road Commissions	Gene Tackett	Gene Tackett	



<b>Date</b>	<b>Meeting</b>	<b>CHSRA Representative(s)</b>	<b>Contact</b>	<b>Notes</b>
5/18/2010	American Council of Engineering Companies, Kern Chapter	Bart Bohn	Tony Luisich	General Presentation on HST from Bakersfield to Palmdale
5/26/2010	Edison Community PIM	Mark Weisman, Tom Tracy, Antonio Molina	Eric VonBerg	PIM for Edison to discuss alternatives

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## **APPENDIX D-2**

### **Outreach Summary Report – Tehachapi Subsection**

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## **Tehachapi Outreach Summary Report September 2009 – August 2010**

### **Overview**

Our team assisted planning staff in developing alternatives analyses and preparations for a scoping meeting which was held on September 16, 2009 in Tehachapi as well as a TWG meeting, which was held on December 9, 2009. During this period, outreach was conducted to local elected leaders regarding station planning, scoping meetings, and next steps for HST on our alignment. Assistance was also provided to the statewide outreach in distributing information on American Recovery and Reinvestment Act (ARRA) funding and the Heavy Maintenance Facility criteria.

### **Tehachapi TWG Meetings**

#### **Tehachapi TWG – December 9, 2009**

General overview of the project

- Status of funding and schedule.

Discussion of program alignment engineering design criteria and local issues.

- Right-of-Way
  - When will it occur? 2-3 months after approving General Plan Update. County specific plans – 1 year. There are two projects that have been held up for the General Plan Update – it is likely there will be impacts to these projects.
- Proposed projects in Tehachapi Area
  - Kern County to send shape files for evaluating new projects that come into the county.
  - Heliport proposed at hospital
  - Mining operation – expanding southwards and need to identify areas
  - Rosamond Blvd. proposed for improvements in the Kern RTP. Rosamond has a fee program for road improvements.
- Landscaping – construct ahead of time
- Southern California Edison – large substation west of Mojave. LAWP substation 10-15 miles north of Mojave.
- Sierra Hwy dead ends at Silver Queen, north of where Sierra Hwy is used as alternative access for SR 14 to Rosamond.

Action Items:

- Plan for PIMs in the following areas:
  - Edison
  - Cesar Chavez
  - Tehachapi
  - Lancaster
  - Defense Contractors
  - Rosamond/Edwards AFB

## Outreach Meetings

The following meetings were conducted or are scheduled to take place from September 2009 through August 2010.

Date	Meeting	CHSRA Representative(s)	Contact	Notes
9/3/2009	Leaders of the Hill	Bob Schaevitz, Mark Weisman, Gene Tackett	Gene Tackett	Update on HST AA process and information gathering from local stakeholders
9/16/2009	Bakersfield to Palmdale Scoping Meeting in Tehachapi	Bakersfield-Palmdale JV Outreach Team	Eric VonBerg	Agency/organization representatives and members of the public attended the scoping meeting, providing comments on alternatives
12/9/2009	Tehachapi TWG	Eric VonBerg, Tom Tracy, Mark Weisman, Gene Tackett	Gene Tackett	TWG for Tehachapi to discuss alternatives
4/1/2010	Kern County Roads and Planning Staff (Warren Maxwell and Cheryl Casdorff)	Mark Weisman, Gene Tackett	Gene Tackett	Gathered information from the County on planned road projects on or near HST alignment
4/16/2010	San Joaquin Valley Road Commissions	Gene Tackett	Gene Tackett	
4/15/2010	Kern County Ag & Water Commission	Gene Tackett, Mark Weisman, Eric VonBerg, Cheryl Lehn	Gene Tackett	Overview of HST and opportunity to get input from ag and water leaders within the agriculture community
4/30/2010	Southern California Edison	Mark Weisman	Glenn Larson	Briefing on HST alignments and inquiry into major SCE facilities that cross or parallel proposed HST alignments. SCE agreed to mark-up alignment maps in Fresno and Palmdale sections so we would have the most recent infrastructure data
6/2/2010	Mojave Air and Space Port	Mark Weisman, Robert Vanderstok, Eric VonBerg	David Russell	Stakeholder advisory and inquiry into Areas of Common interest, discussion of potential impacts

Date	Meeting	CHSRA Representative(s)	Contact	Notes
6/2/2010	Sempra Energy	Mark Weisman, Robert Vanderstok, Eric VonBerg	Rob Duchow	Stakeholder advisory and inquiry into Areas of Common interest, discussion of potential impacts
6/10/2010	Tehachapi Area PIM	Mark Weisman, Gene Tackett, Eric VonBerg, Tom Tracy, Mike Waiczis	Eric VonBerg	PIM for Tehachapi to discuss alternatives
8/12/2010	Pacific Gas & Electric	Mark Weisman, Eric VonBerg	Greg Parker	Briefing on HST alignments and inquiry into major PG&E facilities that cross or parallel proposed HST alignments. PG&E agreed to mark-up alignment maps in Fresno and Palmdale sections so we would have the most recent infrastructure data

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## **APPENDIX D-3**

### **Outreach Summary Report – Antelope Valley Subsection**

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## Antelope Valley Outreach Summary Report September 2009 – August 2010

### Overview

Our team assisted planning staff in developing alternatives analyses and preparations for a scoping meeting which was held on September 17, 2009 in Palmdale as well as a TWG meeting, which was held on December 10, 2009 in Lancaster. During this period, outreach was conducted to local elected leaders regarding station planning, scoping meetings, and next steps for HST on our alignment. Meetings were held to introduce Carrie Bowen to elected officials in the Valley. General outreach presentations were also given to service groups and agencies, and assistance was provided to the statewide outreach in distributing information on American Recovery and Reinvestment Act (ARRA) funding and the Heavy Maintenance Facility criteria.

### Antelope Valley TWG Meetings Lancaster TWG – December 10, 2009

General overview of the project

- Status of funding and schedule.

Discussion of program alignment engineering design criteria and local issues.

- Rosamond – Rosamond Blvd. is 4 lanes out to Edwards. Avenue A is to become the major access to Edwards. Dawn Road does not connect to Sierra Hwy. Re. alternative abandoning Sierra Highway, N. of Rosamond. General consensus is to keep road open as alternative N/S route to SR14. Rosamond Rep to discuss with RCSD officials.
- Lancaster - more development exists on west side of Sierra Hwy. Presumption is that alignment is elevated here and descends to Palmdale station at grade. Elevated tracks would conflict with Ave. L overpass. (Other city overpass is at Avenue H) Other development to consider - "Downtown Transit Village". City discussing 'round about' at Lancaster Blvd. and Sierra Hwy. Gen. plan calls for widening of Sierra Highway to 8 lanes. Whit Carter Park an issue. Michelle Cantrell to send site plans to Palmdale-Fresno planners.
- Palmdale - coming from north, transition from east side of UPRR to west side. Widen Sierra Hwy to 8 lanes. Palmdale wants track at grade at station location. Partial funding for Rancho Vista crossing of Sierra Hwy – potential to work with Authority to construct. Palmdale Hybrid Power Plant on Ave. M, just east of Sierra Hwy and south of Ave. M. Bill Padilla to send site plan to P-F team.
- AVTA - located just west and north of Antonovich courthouse. AVTA looking at possibility of multi-modal facility on east side of Metrolink station. E.D. noted that county court raised issue of noise. Consider special meeting with them.

Timeline

- Review dates for scheduling next TWG meeting and PIM. Looking at early February for both.

Action Items

- Evaluate alternatives

- Conduct Public Info Meetings
- Present findings to Authority/FRA
- Present findings to TWG
- Prepare AA Report
- Conduct environmental fieldwork (send out appropriate notices to stakeholders)

## Outreach Meetings

The following meetings were conducted or are scheduled to take place from September 2009 through August 2010.

Date	Meeting	CHSRA Representative(s)	Contact	Notes
9/3/2009	Lockheed Martin Aeronautics Corp.	Bob Schaevitz, Mark Weisman, Eric Von Berg, Robert Vanderstok	Robert Vanderstok	General discussion on Property, Policies and Personnel relative to alignment considerations adjacent to Lockheed's secured manufacturing and hangar facilities.
9/3/2009	AF Base, Plant 42	Bob Schaevitz, Mark Weisman, Eric VonBerg, Robert Vanderstok	Robert Vanderstok	General discussion on Property, Policies and Personnel relative to alignment considerations adjacent to Plant 42.
9/8/2009	Lancaster Mayor and City Manager	Carrie Bowen, Eric Von Berg, Robert Vanderstok, Ingrid Chapman	Robert Vanderstok	General Pre-Scoping discussion on track and station alignment through Antelope Valley
9/8/2009	Lancaster Vice Mayor	Carrie Bowen, Eric Von Berg, Robert Vanderstok	Robert Vanderstok	General Pre-Scoping discussion on track and station alignment through Antelope Valley
9/8/2009	Lancaster Councilwoman Marquez	Carrie Bowen, Eric Von Berg, Robert Vanderstok, Ingrid Chapman	Robert Vanderstok	General Pre-Scoping discussion on track and station alignment through Antelope Valley
9/9/2009	City of Palmdale Mayor Jim Ledford	Carrie Bowen, Eric Von Berg, Robert Vanderstok	Robert Vanderstok	General Pre-Scoping discussion on track and station alignment through Antelope Valley
9/9/2009	Lancaster City Councilman Ken Mann	Eric Von Berg, Robert Vanderstok	Robert Vanderstok	General Pre-Scoping discussion on track and station alignment through Antelope Valley
9/9/2009	Time Warner Cable Television Broadcast	Eric VonBerg, Robert Vanderstok, Ingrid Chapman	Robert Vanderstok	On Air interview with Eric VonBerg
9/10/2009	Rosamond Municipal Advisory Council	Eric VonBerg, Robert Vanderstok	Robert Vanderstok	PP Presentation to Rosamond Municipal Advisory Council and Rosamond Community Services District



Date	Meeting	CHSRA Representative(s)	Contact	Notes
9/11/2009	Edwards Community Council	Eric Von Berg; Robert Vanderstok;	Robert Vanderstok	Brief newly formed Council on HSR
9/17/2009	Bakersfield to Palmdale Scoping Meeting in Palmdale	Bakersfield-Palmdale JV Outreach Team	Eric VonBerg	Agency/organization representatives and members of the public attended the scoping meeting, providing comments on alternatives
9/30/2009	Quarterly Antelope Valley Transportation Summit	Robert Vanderstok	Hosted by L.A. County Supervisor Michael Antonovich	All north L.A. County transportation issues were discussed in this meeting
11/3/2009	Lancaster City Council Decision on HST Station	Robert Vanderstok	Robert Vanderstok	County Supervisor Antonovich's wish that the station location discussion be agreed upon as "Palmdale" persuaded CC to bow out of race for the HST Station.
12/10/2009	Lancaster TWG	Eric VonBerg, Robert Vanderstok, Bob Schaevitz, Tom Tracy, Mark Weisman	Robert Vanderstok	TWG for Tehachapi to discuss alternatives
12/16/2009	City of Palmdale, Alignment Discussion	LA-Palmdale and Bakersfield-Palmdale JV Outreach Teams	City of Palmdale and Consensus, Inc.	City indicated a general preference for routing alignment close to current UP tracks so as to avoid two separate rail corridors merging into Palmdale from the south. While it is understood that many considerations will make for the final decision in station siting, the city still prefers an alignment that would locate the station at or near the current Palmdale Transportation Center (PTC).
2/10/2010	NASA	Robert Vanderstok	Robert Vanderstok and Consensus, Inc.	Discussion of Station siting and alternative alignments from approx. Sylmar to Palmdale station

Date	Meeting	CHSRA Representative(s)	Contact	Notes
2/16/2010	Antelope Valley Republican Women (AVRW)	Robert Vanderstok	Robert Vanderstok	Presented HSR Update. Verbal presentation Discussed features/benefits, process, timing, and financing.
2/16/2010	Sylmar to Palmdale Stakeholder Working Group	LA-Palmdale JV Outreach Team, Robert Vanderstok (Bakersfield-Palmdale)	Robert Vanderstok	Discussion of Station siting and alternative alignments from approx. Sylmar to Palmdale station.
2/24/2010	Rosamond Community Services District	Mark Weisman, Robert Vanderstok	Jack Stewart	Discussed alignment through Rosamond and High Desert
2/24/2010	City of Lancaster	Mark Weisman, Robert Vanderstok	Nicole Rizzo	Reviewed city's alignment preferences from north of city to Palmdale station
3/23/2010	North County Transportation Coalition (NCTC)	LA-Palmdale JV Outreach Team, Robert Vanderstok	Robert Vanderstok	LA-Palmdale Team presented to NCTC
4/16/2010	San Joaquin Valley Road Commissions	Gene Tackett	Greg Pope	Update on HST project and answer any questions of road staffs
4/26/2010	LA County Supervisor Staff	Robert Vanderstok	Robert Vanderstok	Primarily interested in Acton/Agua Dulce area (LA-Palmdale Team). This meeting was scheduled, based on a request from Supervisor Michael Antonovich's Chief Deputy, Kathryn Barger, to Robert Vanderstok (Bak-Palmdale team).
4/29/2010	Brian Ludicke, Lancaster Planning Director	Mark Weisman, Robert Vanderstok	Robert Vanderstok	Lancaster planning issues and alignment preferences
4/30/2010	Southern California Edison	Mark Weisman	Glenn Larson	Briefing on HST alignments and inquiry into major SCE facilities that cross or parallel proposed HST alignments. SCE agreed to mark-up alignment maps in Fresno and Palmdale sections so we

Date	Meeting	CHSRA Representative(s)	Contact	Notes
				would have the most recent infrastructure data
4/30/2010	Antelope Valley Community & Edwards AFB staff	Robert Vanderstok	Lee Baron & Mike Strickland	General presentation on HST in the Antelope Valley
5/18/2010	Quartz Hill Town Council	LA-Palmdale Team	Robert Vanderstok	Stakeholder meeting to discuss HST alignments, primarily south of Palmdale
5/27/2010	Fire Station 129, Association of Rural Town Councils Presentation	LA-Palmdale Team	Robert Vanderstok	Stakeholder meeting to discuss HST alignments, primarily south of Palmdale
6/1/2010	University Antelope Valley	Mark Weisman, Robert Vanderstok	Robert Vanderstok	Brief Primary stakeholder about alternative alignments along Sierra Highway, which would impact UAV, located on same corridor alignment
6/1/2010	Hispanic Chamber of Commerce	Mark Weisman, Robert Vanderstok	Robert Vanderstok	General presentation on HST in the Antelope Valley
6/2/2010	Sempra Energy and Mojave Air and Space Port	Mark Weisman, Eric VonBerg	Eric VonBerg	Stakeholder advisory and inquiry into Areas of Common interest, discussion of potential impacts
6/2/2010	Lancaster (Antelope Valley) PIM	Mark Weisman, Robert Vanderstok, Eric VonBerg	Robert Vanderstok	PIM for Antelope Valley to discuss alternatives

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